Framework For Multivariate Continuous Transformation Towards Learning Organization

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Un Cadre de Référence pour la Transformation Continue Multi-facettes vers une Organisation Apprenante

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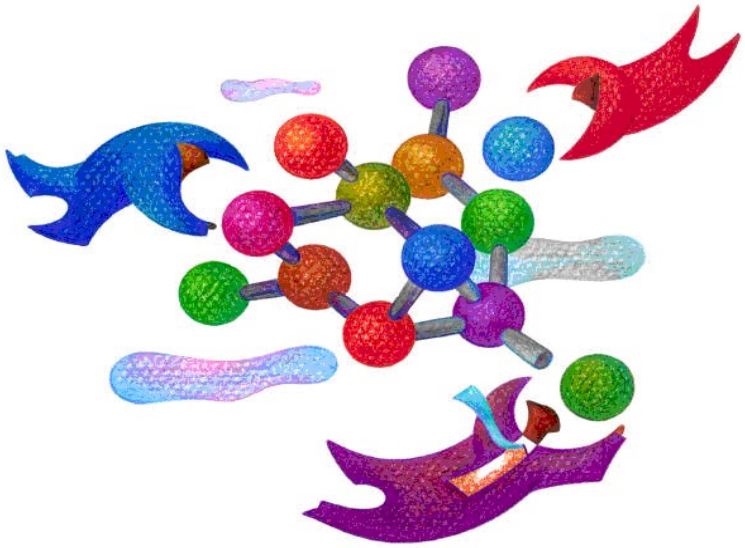
FRAMEWORK FOR
MULTIVARIATE CONTINUOUS TRANSFORMATION TOWARDS
LEARNING ORGANIZATION



Mijalche Santa

A thesis submitted to the faculty of the University of Paris 1 - Panthéon - Sorbonne in partial fulfillment of the requirements for the degree of Doctor of Philosophy (Ph.D.) in Computer Science

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Paris, France

Mijalce Santa

Archivist: What if no one believes you?

Sonmi-451: Someone already does.

Movie Cloud Atlas [Wachowski et al., 2012]

For Ilin and Dushica

Acknowledgements

In the past ten years I have had a dream. A dream that has kept me awake at night. A dream that needed a strong, first step in order to become reality in some future days. Six years ago I made the first step. I enrolled a PhD at University Paris 1 – Pantheon – Sorbonne. I aimed to create a scientifically based, practically useful solution to a problem, I found it important. I spent the last six years in thinking about it, working on it, hating it, loving it, being depressed by it and had some of the best moments in my life.

Now you are reading the result of those six years. However, although it is independent work, the result was not possible without the help of some people.

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1 I have never met Mark in live, all our discussions are through email and Skype.

Mijalce Santa

Abstract

The goal of this work is to develop a framework for multivariate continuous transformation towards a learning organization. In order to achieve this goal, by using the design science methodology, we have developed the Learning Organization Atlas Framework.

The learning Organization Atlas Framework includes the four following elements:

Facets. The facets are particular aspects of the learning organization. Each facet contains a set of relevant attributes through which that particular aspect is clarified. The multi facet view makes it possible to look at the learning organization in a comprehensive manner.

Grid. The grid is a result of the combination of following lenses (dimensions): ecological, developmental and stakeholder. The ecological lenses represent the learning organization entities. the following learning organization entities were identified: individuals, teams, departments, organization, direct environment and general environment. The developmental lens shows the levels at which the entity can be. the developmental lens includes three levels: Level 0 - No learning; Level 1 - Single-loop learning; and Level 2 - Double-loop learning. The stakeholder lens is a viewpoint lens. Through it, the different views that different stakeholders can have about the facets of the organization are represented. Stakeholders identified in the learning organization are employee, manager, executive.

Maps. The maps are created through a grid application on each individual facet

Atlas. An atlas is a collection of facets maps. The atlas enables the process of layering and de-layering the individual facets's maps.

Roadmap. The roadmap provides guidelines to the organizations, their learning needs, and the required changes to be made

The Learning Organization Atlas Framework was instantiated in a web tool. The framework, through case studies research, was implemented and evaluated in six companies.

Table of Contents

Mijalce Santa

Chapter 1

Introduction

Sol: Oh, is that him?
Vinny: I don't know, how many fingers did he have?
Sol: I'm sorry I couldn't get the bin-noc-u-lars out in time.
Vinny: Look, well let's not stand in no ceremony mate, let's start the show.

movie Snatch, [Ritchie, 2001]

1.1 Research context

Managing organizations today is difficult. Organizations today operate in a complex external and internal environment. Vital planning assumptions continuously change due to dynamic developments and events in organizations' external and internal environments [Karp, 2006], such as technological discontinuities [Romanelli and Tushman, 1994] and turbulence [Lant and Mezias, 1992].

Creating and sustaining competitiveness is harder due the challenges of globalisation, changing customer and investor demands and increasing product-market competition [Jashapara, 2004]. Furthermore, the pressure on responsiveness, emphasis on product and service quality, diversity and customization increases the level of, ever changing, complexity executives have to manage.

In order to stay competitive in this context the organization needs to be on the "edge of chaos" [Burnes, 2005; Davis et al., 2007]. It needs to have the capacity to create and add value by taking effective action in varied and uncertain situations [Bennet and Bennet, 2003]. Franken & Braganza [2006] argue that in the new economy, a firm's sustainable competitive advantage flows from its ability to create and exploit new knowledge; to learn faster than its competitors [Jashapara, 1993]; to engage in rapid and relentless continuous change [Brown and Eisenhardt, 1997]; to become a learning organization [Davis and Daley, 2008; Jashapara, 1993; Senge, 1990; Pedler et al., 1991].

According to The Boston Consulting Group [2008] in a world driven by innovation and rapid change, becoming a learning organization from top to bottom—provides a clear competitive advantage and will become more important in the future [2008; 2010]. Also, the survey of the business magazine "Strategy+business" [Kleiner, 2005] ranked "the Learning Organization" idea as the second most enduring idea about strategy and business, out of 10 ideas most likely to last at least another 10 years. The importance of the learning organization was also identified by the European Commission [2001, p.21] stating "it is essential to promote more actively enterprises and other organizations to become learning organizations". Furthermore, in [2006] McKinsey & Company survey revealed that almost nine in ten respondents say agility is either "extremely" or "very" important to business performance, and 86 percent say the same about speed. Furthermore 91% of the respondents think that the importance of agility and speed increased in the past 5 years[2].

2 In the survey an organization's "agility" was defined as its ability to change tactics or direction quickly—that is, to anticipate, adapt to, and react decisively to events in the business environment. "Speed" was defined as a measure of how rapidly an organization executes an operational or strategic objective

According to Pedler et al. [1991] a learning organization is an organization that facilitates the learning of all its members and consciously transforms itself and its context. It is an organization skilled at creating, acquiring, interpreting, transferring, and retaining knowledge, and at purposefully modifying its behavior to reflect new knowledge and insights [Garvin, 2000, p.11].

Since the publication of Senge's [1990] highly cited book "The Fifth Discipline: The Art and Practice of the Learning Organization" the research regarding the learning organization has proliferated. A huge number of definitions have been developed and presented in literature. This has been followed by a number of models that represent the learning organization. The most notable being: Energy flow model [Pedler et al., 1991] and seven dimensions model [Watkins and Marsick, 1993]. Also, a lot of diagnostics instruments have been developed like Learning company blueprint [Pedler et al., 1991], Dimensions of the Learning Organization Questionnaire [Watkins and Marsick, 1993; Yang et al., 2004], Learning organization profile [Marquardt, 1996], Organizational Learning Survey [Goh and Richards, 1997], and the Learning organization survey [Garvin et al., 2008].

Although it has been identified that successful learning organizations elicit, code, store, and create knowledge [Marquardt and Reynolds, 1994], research from information systems' perspective is missing. The information systems research is important because, as [King, 2001] has identified, the information systems infrastructure strategy is the first strategy that should be started for development of the learning organization. The information systems and the appropriate technologies are at the centre of the learning organization [Thomas and Allen, 2006]. This PhD research aims to fill that gap.

1.2 Problem statement

Despite the extensive debate about the value of learning organizations in order to be competitive and presentation of it positive sides, the learning organization has also raised a lot of criticism and dilemmas. This criticism is focused on three issues: Concept (What is a learning organization?), Methods and models (How to become a learning organization?) and Measurement (How to evaluate the learning organization?).

1.2.1 What is a learning organization (LO)?

"A clear definition of learning organization has proved to be elusive over the years" [Garvin, 2000, p.9]. The discussions are more reverential and utopian, filled with near mystical terminology [Garvin, 1993]. All LO definitions use natural language system [Wacker, 2004; Teas and Palan, 1997] which is not precise enough for formal empirical theory-building research. The

definitions are also too inclusive, too general or too vague. This problem is clearly evident in the most cited definition of Senge [1990] which is full of vague and ambiguous terms. This creates a linguistic relativity which is a core problem of the learning organization [Grieves, 2008]. Furthermore, there is still confusion between the learning organization and the organizational learning. In this PhD the suggestion of Örtenblad [2001], to see the learning organization as a form and the organizational learning as a process, is accepted.

Although the definitions provide insight in the LO, in order to understand it in detail, it is necessary to identify all the properties of LO. This is very important for a multidimensional construct like LO [Yang et al., 2004].

1.2.2 How to become a learning organization?

The literature does not see the LO as a state that can be achieved, but as the Holy Grail [Jashapara, 1993], "snark" [Tosey, 2005], a continuous journey. A journey on which, the organization will continuously learn and change to stay on the edge of chaos [Waldrop, 1992]. There is still limited understanding of how organizations accomplish this, and even less supported by empirical research (Easterby-Smith et al. 1999; Davis & Daley 2008; Tsang 1997). The existing models are often based on the authors' consulting experience rather than systematic and rigorous research [Tsang, 1997]. This results in no practical operational advice which managers can use [Garvin, 2000] or a template that can be used [Cavaleri, 2008]. According to the survey of The Boston Consulting Group [2008; 2010], although the learning organization is an important topic, the organizations currently have low capabilities to achieve it. In this direction, Redding [1997] explains that there is no single approach to build a learning organization, because each approach should be customized by taking in account the following aspects:

- Use language that fits the company;
- Build on the existing structures and processes;
- Recognize past successes that support the learning organization concept.

Additionally, when developing the model of the learning organization, too many dimensions and variables need to be taken into account. It is very hard to identify the casual relationships between them [Grieves, 2008]. This is also evident in the empirical research that is more focused on the outputs of the elements of the LO than on the relationships between the elements.

This mismatch in practice, between the strong expression of importance and the need of the learning organizations and the lack of capabilities, knowledge and paths how to create a learning organization, strongly weakens the idea of the learning organization and its application.

1.2.3 How to evaluate the learning organization?

Smith and Tosey [1999] have a position that if the learning organization is achievable, it should be measurable. The measurement of the learning organization is an important aspect because as Garvin [1993] has said, 'managers have long known that if you can't measure it, you can't manage it' (p. 89) and can not improve it [Smith and Tosey, 1999]. However, tools and assessment instruments to measure the learning organizations are lacking [Garvin, 2000; Garvin et al., 2008] and there is unsubstantial empirical basis [Rebelo and Gomes, 2008].

Based on the previous, it can be concluded that the definitions, methodologies for development of the learning organization and its measures need to be improved.

1.3 Research question and goals

As a result of the above presented- the main research question (RQ) for this PhD thesis is:

Main RQ: How to continuously transform an organization to a learning organization?

The goal is to create a multi-attribute and multi-level framework for continuous transformation to a learning organization that will guide the organizations in their pursuite of becoming and staying a learning organization. This framework needs to be instantiated in a web based software that the organizations can use it. To achieve this goal I need to deal with two types of problems: knowledge and practical problem [Wieringa, 2009]. As defined by Wieringa, a knowledge problem as a difference between current knowledge of stakeholders about the world and what they would like to know and a practical problem is a difference between the way the world is experienced by stakeholders and the way they would like it to be. For practical problems solutions should be provided and for knowledge problems answers should be given. In design science, these two kinds of problems are mutually nested. As a result solving a practical problem may lead the problem solver to ask knowledge questions, and answering these knowledge questions leads the problem solver to new practical problems. The top level problem is always a practical problem [Wieringa, 2009] i.e. the multi-attribute and multi-level framework in this thesis. Based on this the research questions can be divided in design questions for practical problems and conceptual questions for knowledge problems.

The following sub-questions will help me provide an answer to the main research question. For each question it is indicated is it a knowledge or design question.

RQ1 (Conceptual question): What are the elements and relations that define the learning organization?

The purpose is to design an ontology-based model that makes it possible to conceptually express the logic of the learning organization i.e. create a conceptual model and an ontology of the learning organization.

RQ 2 (Design question): How can the learning organization improve its learning?

The goal is to design a pool of dynamical (changing) processes that can be applied as a guideline for the learning organization model i.e. create a dynamic form of the learning organization.

RQ 3 (Design question): How should the learning organization identify the triggers for transformation?

The answer to this question should provide identifiable points in time, based on the internal and external environment events through which the process of new transformation should be started.

RQ 4 (Conceptual question): What are the criteria for evaluation of the learning organization continuous transformation?

The answer should provide information how the continuous transformation of the learning organization may be evaluated i.e. by creation of an evaluation instrument.

Any attempt to answer these questions should take into account the following aspects:

- Multi-attribute. By including as many as needed attributes of the learning organization, a better picture of it can be painted. From this pool of attributes, through a critical analysis. the important attributes and their relationships will be identified;
- Multi-level. The learning organization is a multi-level construct. All its attributes should be looked through levels. For example, in learning – single-loop, double-loop and deutero learning; strategy – corporate, functional and operational level; organizational – individual, team, organization; stakeholder – employee, manager, executives, etc. By including the levels, it is recognized that the approaches used for development of the learning organization should be multi-level and customized for each level;
- Context aware. Each organization can learn. Each organization learns in different contexts. These differences in the context should be anticipated in the models for the development of a learning organization. By including the context, the flexibility of the model will be provided and its wider applicability enabled;
- Changing the model. Learning implies change. Learning, as the core element of the learning organization, enables it to change. The model should respect this imperative and

provide options that will enable it to change with time.

1.4 Structure of this dissertation

This PhD consists of the following chapters:

Chapter 1 - Introduction

In the introduction chapter the research context is presented and justification for this research is provided. Then, three issues on which the learning organization is criticized are presented by postulating the questions: what is a learning organization, how to become a learning organization and how to evaluate a learning organization? At the end, the main research question and four research sub-questions are presented.

Chapter 2 - Approach to solution

In this chapter the overall approach to the solution is provided. It describes the structural elements of the solution and the process through which the solution will be delivered. The approach is based on the design science research methodology for information systems. The outputs of the design science research for this PhD are: facets of the LO, LO ontology, LO dynamic model, LO framework and tool. To deliver these outputs, a method mix of building and evaluating methods has been proposed.

Chapter 3 - State of art

Through this chapter an extensive analysis of the LO literature has been performed. The literature included in the research is listed in Appendices A and B. The "four worlds" framework has been used for the analysis. The result is a comparative literature analysis structured in subject, usage, system and development world.

Chapter 4 – The Learning Organization Ontology

To develop the learning organization ontology, in this chapter, first the learning organization conceptual model was presented and explained. Then, the modeling patterns were identified, graphically presented and discussed. At the end, the lightweight learning organization ontology was developed.

Chapter 5 – Learning Organization Atlas Framework

The objective of this chapter is to introduce a multilevel and multifaceted framework for dynamic development of the learning organization. First, it presents the related work by analyzing existing models. Then, it describes the map analogy and how it is applied to the proposed framework. After that, it introduces the Learning Organization Atlas Framework and its elements: facets, lenses, grid, maps, atlas and roadmap.

Chapter 6 - Learning Organization Atlas Framework Web Tool

In this chapter the web tool, as instantiation of the learning organization atlas framework, is presented. It includes a review of the existing diagnostic tools and their instantiations. It presents the elements of the web tool: identify, atlas, alignment and roadmap. Furthermore, it explains the process of transformation of the respondent's survey answers to map representation and development of the roadmaps. At the end, it presents a guideline for using the web tool.

Chapter 7 - Application of the LOAF Web Tool

The objective of this chapter is to present an application of the Learning Organization Atlas Framework and of the Web Tool in five companies. For each company the evaluation process is explained, including information gathering, mapping and roadmaping. Each element is textually and graphically explained.

Chapter 8 - Conclusion

The objective of this chapter is to discuss the future of the framework and the tool. First, the contributions to the theory and practice that this thesis makes, are explained. Then the limitations of the framework and the tool are discussed. Based on that, the future of the framework is presented, including the possible options for further development and its application in different domains.

Chapter 2

Approach to solution

Avi: Tony, there is a man I'd like you to find.
Bullet Tooth Tony: Well, that depends on all the elements in the equation. How many are there?
Avi: Forty thousand.

Movie “Snatch” [Ritchie, 2001]

2.1 Objective

Identifying the right solution approach for this dissertation was a project in itself, due to several reasons. First, is the very topic of the learning organization. Even though it is a frequently studied topic, there is still no generally accepted way to research the concept [Davis and Daley, 2008]. Second, according to Lee [2001] the research in the information systems field should examine more than just the technological system, or just the social system, or even the two, side by side; it should investigate the phenomena that emerge when the two interact and contribute to both of these systems. Third, the outputs that this thesis aims to deliver require combination and application of different research processes, frameworks and methods.

The objective of this chapter is to develop and present a logical and scientifically based methodology through which the research questions will be answered. To achieve this, I have opted for a two-level-approach to the solution. On the first level, the approach should provide an overall guideline for the development of the solution, while the second level should consist of various research frameworks, methods and methodologies, tailored for each specific element of the solution. Taking into account the previously said the following decisions were made for the solution approach [Santa, 2013]:

- The overall methodology of this PhD is based on the design science paradigm and it follows the design science research approach in information systems;
- Based on the design science paradigm for each element of the solution, appropriate building methods are identified;
- Every output of this PhD will be evaluated through an appropriate evaluation method.

The elements for this solution approach are presented in Figure 1 and explained later in this chapter.

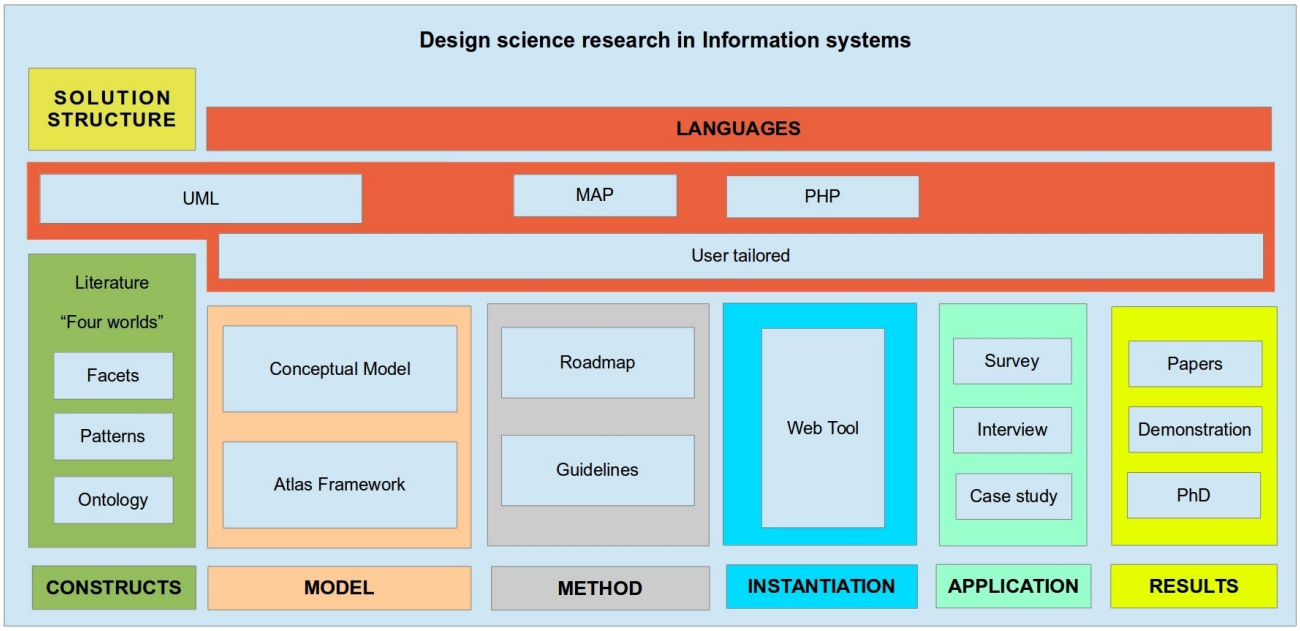

Figure 1: PhD solution approach

2.2 Design science

Information systems, as a design science is more and more acknowledged by the research community [March and Smith, 1995; Lee, 1999; Hevner et al., 2004; Wieringa, 2009; Hevner and Chatterjee, 2010; Peffers et al., 2008]. According to Hevner et al. [2004] "design science...creates and evaluates IT artifacts intended to solve identified organizational problems". Problems that are characterized by:

- unstable requirements and constraints based on ill-defined environmental contexts;
- complex interactions among subcomponents of the problem;
- inherent flexibility to change design processes, as well as, design artifacts (i.e., malleable processes and artifacts);
- critical dependence upon human cognitive abilities (e.g., creativity) to produce effective solutions; and
- critical dependence upon human social abilities (e.g., teamwork) to produce effective solutions.

The learning organization shares these characteristics and it proves itself suitable for design science research. In order to perform rigorous design science research, it is important to provide answers to three aspects: outputs, method mix and process.

2.3 Outputs

Vaishnavi and Kuechler, Jr [2007] based on the work of other researchers [March and Smith, 1995; Rossi and Sein 2003; Purao 2002] have summarized the outputs in which a design science research effort can result:

- Constructs – the conceptual vocabulary of a domain;
- Models – a set of propositions or statements expressing relationships between constructs;
- Methods - set of steps (an algorithm or guideline) used to perform a task;
- Instantiation – the operationalization of constructs, models, and methods; and
- Better theories – artifact construction as analogous to experimental natural science.

The goal of this PhD is to create a multi-facet and multi-level model of continuous transformation to a learning organization that will guide the organizations in their pursuit of becoming and staying a learning organization. I propose to achieve this goal by answering the following research questions:

- What are the elements and relations that define the learning organization?
- How should the learning organization change itself in order to continuously transform itself?
- How should the learning organization identify the triggers for transformation?
- What are the criteria for evaluation of the learning organization continuous transformation?

Answers to these questions will create the outputs presented in table 1. Each output is discussed afterwards.

Output		PhD thesis outputs
1	Constructs	Learning organization facets Learning organization patterns Learning organization ontology
2	Models	Learning organization conceptual model Learning organization atlas framework
3	Methods	Roadmap and guidelines
4	Instantiation	Web tool
5	Better theories	/

Table 1: The Outputs of Design Science Research for this PhD

2.3.1 Facets of the LO

The learning organization is a multidimensional construct [Yang et al., 2004], and in order to understand it in detail, it is necessary to identify all facets of the LO. To go more in-depth, the corresponding attributes for each facet will be identified, and the possible values of that attribute will be presented. The "four-worlds" framework [Jarke et al., 1993; Rolland, 1998] will be used to analyze the literature and identify the facets, attributes and the values. The output will be presented in a table that contains each individual world, facets identified for the respective world, attributes for each facet and values that each attribute can have, as presented in table 2:

	World	Facet	Attribute	Value
Learning organization	1 2 3 4	1.1 1.2 2.1 ….	1.1.1 1.1.2 2.1.1 …	1.1.1.1 1.1.1.2 2.1.1.1 …

Table 2: "Four-worlds' output

2.3.2 Patterns and Ontology

The learning organization literature is full of vague and ambiguous language. There is a large number of definitions, characteristics, models and frameworks that create a conceptual jungle. As a result, we still lack a shared understanding of the learning organization and a clear representation of the learning organization concept [Grieves, 2008]. In the context of building an

IT system this leads to difficulties in identifying requirements, and thus, in defining the specification of the system [Uschold and Gruninger, 1996].

To overcome this barrier, I have identified the ontology of the learning organization as an output of this PhD thesis. Ontology is an explicit specification of a conceptualization [Gruber, 1993]. An explicit specification means the concepts and relationships of the abstract model are given in explicit terms and definitions [Gruninger and Lee, 2002]. The ontology will be based on the learning organization patterns. The patterns are defining characteristics of a system and often, therefore, indicators of essential underlying processes and structures (Grimm et al., 2005). Thus, they are appropriate base for development of the ontology. Learning organization modeling patterns and the ontology elements will be described precisely, textually and graphically.

For a graphical representation of the LO modeling patterns, I will use the UML notation and class diagrams, as presented in figure 2.

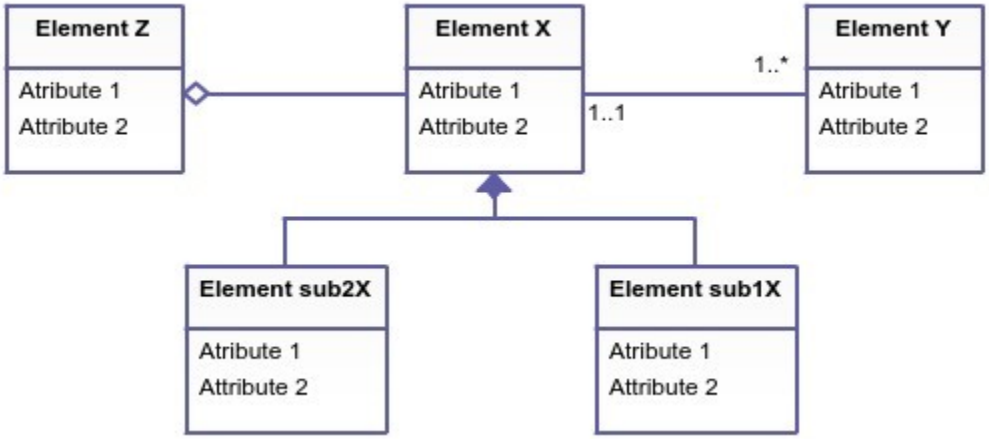

Figure 2: Graphical description of LO ontology elements

2.3.3 Conceptual Model and Atlas Framework

The purpose of the conceptual model is to structure the results of the "four world" analysis. Through it, the identified facets and their relations are positioned on the dimension invisible/ visible. As such, the conceptual model supports the development of the patterns and the ontology.

On the other hand, the atlas framework is built in order to respond to the challenges identified in the literature regarding the modeling of the learning organization: large number of facets,

attributes and variables that construct the learning organization [Yang et al., 2004]; the complex relationships within and between the facets [Grieves, 2008]; the learning organization is not a state, it is a chameleon-like target that is continuously changing [DiBella, 1995]. To meet this issues the learning organization atlas framework, based on the analogy of maps introduces the grid and maps, and combines them with the facets and the roadmap.

2.3.4 Roadmap and guideline

Reality is a dynamic entity, it is changing continuously and it has both structure and behavior. This means that the framework should support this. The roadmap is used to express and model the changes that the organization can make. The behavior is a result of the impact of change on the business goals, subsequent to changes in internal and external factors, and will secure the competitiveness of the organization in the new surroundings. The roadmap should provide options to the organization for securing this competitiveness. Furthermore, each organization is different and needs to find its own path in becoming a learning organization [DiBella, 1995; Redding, 1997]. To achieve this, the roadmap builds on the change process model of EKD – Change Management Method [Nurcan et al., 1999]. The roadmap consists of trigger box, engine, indicators and feedback. Each element will be textually described, while the engine will be also graphically described.

- Trigger box (Table 3). The box contains scanners through which it collects information from the internal and external environment of the learning organization. The information is evaluated with identified values in the box and as result they can start the engine. The triggering will be a result of general rules that are instantiated later for each concrete situation.

Trigger	Name
Belongs to	Facet to which this trigger belongs
Information source	Internal or external source which supplies information that the trigger uses
Time frame	Time period after which information is retrieved from the source
Values	Values that the trigger can have and through which the information is evaluated
Decision rules	Predetermined rules that the trigger has, and based on which it can start the engine or not

Influences what	Which actions are started when the trigger is initiated

Table 3: Trigger box structure

- Engine. The engine is the core element of the roadmap. Through it the actual realisation of the roadmap is determined. The engine is a collection of sections developed using the MAP framework. Each section contains intention, strategy and relationships (Table 4).

Section	Name <source intention, target intention, strategy>
Intention	Goal that we want to achieve
Strategy	An approach to achieve the target intention
Relationships	Identifying the precedence/ antecedence relationship between sections

Table 4: Engine structure

To graphically describe the section, I will use the MAP as a graph.

- Indicators. The indicators are used to measure the achievement of the intentions in the engine. They will contain values upon which the outcomes will be measured (Table 5). The measurement results will be sent back to the model through a feedback system.

Indicator	Name
Values	Values that the indicator can have and through which the output is evaluated

Table 5: Indicator element

- Feedback. The feedback will be used to provide information back to the system (Table 6).

Indicator	The source of the feedback
Trigger	The recipient of the feedback

Table 6: Feedback element

2.3.5 Web tool

Once the framework is designed, it can be turned to a tool. The web tool will be a software application that can be used by the companies to identify how they can transform to a learning company. The tool will have a simple and intuitive interface, and will be suitable for use by the

employees in the company. The tool will be evaluated and refined through company case studies.

2.4 Method mix

Hevner et al [2004] states that in order to have a research rigour, the design science research needs to rely upon the application of rigorous methods in both, the construction and evaluation of the design artifact. Design science research can, in principle, use all known methods for data gathering and analysis [van Aken and Romme, 2009]. This makes it necessary to identify an adequate method for each specific research objective and step, resulting in an overall method mix [Osterwalder, 2004]. It should be taken into account that the research efforts and methods often cover multiple cells [March and Smith, 1995]. The method mix needed for the realisation of the objectives of this PhD is presented in table 7. Afterwards each model is presented in more details.

PhD Outputs	Building Methods	Evaluating Methods
Facets	Literature research "Four worlds" framework	Literature analysis
Ontology Patterns	UML Conceptual modeling	Literature analysis
Conceptual model Atlas framework	Conceptual modeling	Interview
Roadmap	MAP	Case study
Web tool	PHP	Case study/ Survey

Table 7: Method mix (based on March and Smith, 1995)

2.4.1 Building methods

2.4.1.1 Four worlds

The "four worlds" framework was developed by Jarke et al., Roland [1993; 1998] and has been successfully used for requirements engineering [Jarke et al., 1993], process engineering [Rolland, 1998] and change engineering [Nurcan and Rolland, 2003]. The framework consists of four worlds: subject, usage, system and development.

For each world the appropriate facets, attributes and values of the attributes are identified.

2.4.1.2 UML and Conceptual modeling

Unified Modeling Language (UML) is a standardized general-purpose modeling language in the field of object-oriented software engineering. It is the standard modeling language for systems and software development. The main advantages of using the UML are [Miles and Hamilton, 2006]:

- it's a formal language – Each element of the language has a strongly defined meaning, so it will not be misunderstood;
- It's concise – the language uses simple and straightforward notation;
- it's comprehensive – it describes all important aspects of a system;
- it's scalable – it can be used for massive projects, but it can also scale down to small projects, avoiding overkill.

UML is also applicable to this PhD because it has a rich set of diagrams for the representation of both structural and behavioural aspects of a system [de Cesare et al., 2003].

2.4.1.3 MAP

While the UML is used to present the patterns and ontology, the MAP framework will be used to develop the engine of the roadmap. The MAP concept was introduced by Rolland [1998] as a notion through which we represent the "as-is" and "to-be" system. According to Rolland and Prakash [2001] a map is composed of one or more sections. A section is an aggregation of two types of intentions, the source and target intentions together with a strategy. An intention is a goal that can be achieved by the performance of a process. There are two special intentions, Start and Stop, to begin and end the map, respectively. A strategy is an approach, a manner to achieve an intention. The MAP also includes:

- Path relationship through which a precedence/antecedence relationship between sections are established;
- Thread relationship identifies the different ways through which the target intention is realized;
- Bundle relationship is an expression of the fact that exactly one of its sections can be used in realising the target intention;
- Refinement relationship shows that a section of a map can be refined as another map through the refinement relationship.

Each map will be represented as a directed graph (see Figure 3) from Start to Stop. In this graph,

intentions are represented as nodes, and strategies as edges between these. The graph is directed because the strategy shows the flow from the source to the target intention. To avoid confusion by using the word map in different context, in the remainder of this thesis this will be called "Road map".

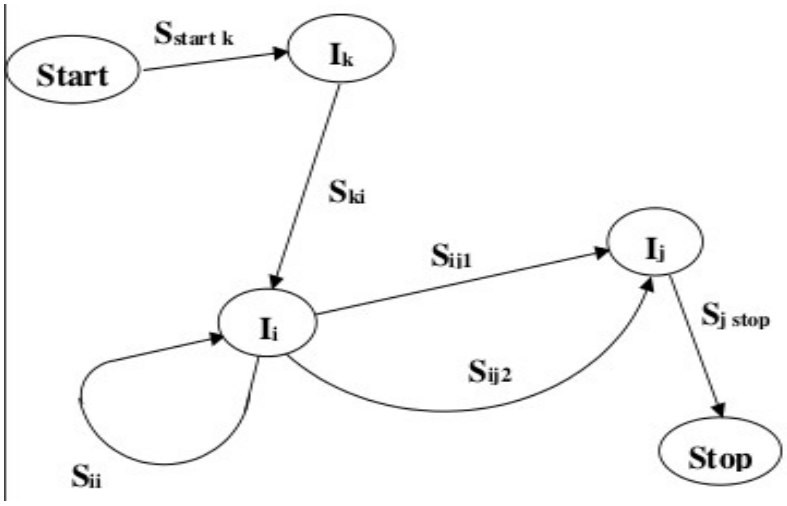

Figure 3: The map as a graph [Rolland and Prakash, 2001]

2.4.2 Evaluation methods

2.4.2.1 Literature analysis

Literature research (which is also part of most of the other methodologies) summarizes and synthesizes past research, and highlights some of the important conclusions. On the other hand, literature analysis examines many (perhaps all) past studies in a particular area and conducts a scientific meta analysis of the cumulative knowledge [Palvia et al., 2003]. Machi and McEvoy [2008] argue that the goal of a basic literature research (library research) is to summarize and evaluate the existing knowledge on a particular topic and to produce a position on the based on that knowledge. On the other hand, an advanced literature research (literature analysis) goes further and provides the foundation for identifying a problem that demands original research. It is a stepping stone for discovering what is not yet known about the topic. It is important to have good literature research and literature analysis because it [Creswell, 2008]:

- shares the results of other studies that are closely related to the one being undertaken;
- it relates the study to a larger, ongoing dialogue in the literature, filling gaps and

extending previous studies;
- it provides a framework for establishing the importance of the study, as well as, a benchmark for comparing the results with other findings [Creswell, 2008].

The library research and analysis will be used throughout the whole dissertation as an input to the various research steps.

2.4.2.2 Survey

The "survey" method was extensively used in MIS research and is still in predominant use. While the method can attain high levels of external validity, it is known to suffer from lack of control and internal validity. Thus, research based on survey methodology should be evaluated in light of the identified weaknesses, and furthermore, researchers should take proper measures to ensure that survey methodology is not being used under inappropriate contexts [Palvia et al., 2003]. The survey should provide a quantitative description of the opinions of the targeted industries by studying a sample of that population [Creswell, 2008]. In this dissertation the survey will be used to get data from the companies for realisation of the web tool.

2.4.2.3 Interviews

Palvia et al [2003] included "interviews' as a separate category although it is typically part of other methodologies, such as case studies and qualitative research. The main reason is that this method is repeatedly mentioned – either by itself or in combination with other methodologies – as the primary method of data collection. The purpose of the in-depth interviews is to understand the lived experience of the companies and the meaning they make from it [Seidman, 2006]. The interview will be used to evaluate the Learning Organization Atlas Framework.

2.4.2.4 Case study

The distinctive need for the case study comes from the need to understand complex phenomena and to retain the holistic and meaningful characteristics of continuous transformation of organizations [Yin, 2009, p.4]. More specifically, the case study has a distinctive advantage when questions of why or how are asked for contemporary set of events over which the investigator has little or no control [Yin, 2009, p.13]. Case studies have faced critique from the researchers preferring quantitative research [Miles, 1979] or there are misunderstandings regarding the case study approach [Flyvbjerg, 2006]. But, the case studies can be used to create generalizations [Wieringa, 2013] and build theory [Eisenhardt, 1989]. Lee [1989] provides a succinct description of this "scientific" methodology and argues that case study research can have as much rigour as quantitative research. The case study in this dissertation will be used to perform evaluation of the

Web tool. Furthermore, the input from the cases will be used to further develop the constructs.

2.5 Process

Iivari [2007] claims that the construction process should be made as transparent as possible if it is to be considered as a design science activity. It is not enough for the artifact to just come out of the blue. There are several methodologies that propose how a research in design science should be performed [March and Smith, 1995; Vaishnavi and Kuechler, Jr, 2007; Hevner, 2007; van Aken and Romme, 2009; Wieringa, 2009]. Peffers et al. [2008] through a consensus approach based on literature review has developed a methodology design science research methodology for information systems. This nominal methodology consists of six activities. In Table 8 I am relating the activities to the elements of the PhD solution approach (Figure 1).

Activity		Description	PhD element
1	Problem identification and motivation	Define the specific research problem and justify the value of a solution.	Research
2	Define the objectives for a solution	Infer the objectives of a solution from the problem definition and knowledge of what is possible and feasible	Research
3	Design and development	Create the artifact. This activity includes determining the artifact's desired functionalities and its architecture, and then creating the actual artifact.	Constructs Model Method Instantiation
4	Demonstration	Demonstrate the use of the artifact to solve one or more instances of the problem	Instantiation Application
5	Evaluation	Observe and measure how well the artifact supports a solution to the problem. This activity involves comparing the objectives of a solution to actual observed results from use of the artifact in the demonstration.	Application
6	Communication	Communicate the problem and its importance, the	Results

		artifact, its utility and novelty, the rigor of its design, and its effectiveness to researchers and other relevant audiences, such as practising professionals, when appropriate	

Table 8: Design science research methodology

Because this PhD will deliver several outputs, I have also developed a timeline in which I present how this PhD has been realized (Figure 5). After the creation of each output, by using the identified building methods, an appropriate evaluation method has been applied. The outputs created a base for papers that have been published in conferences and journals. The final result is this PhD thesis.

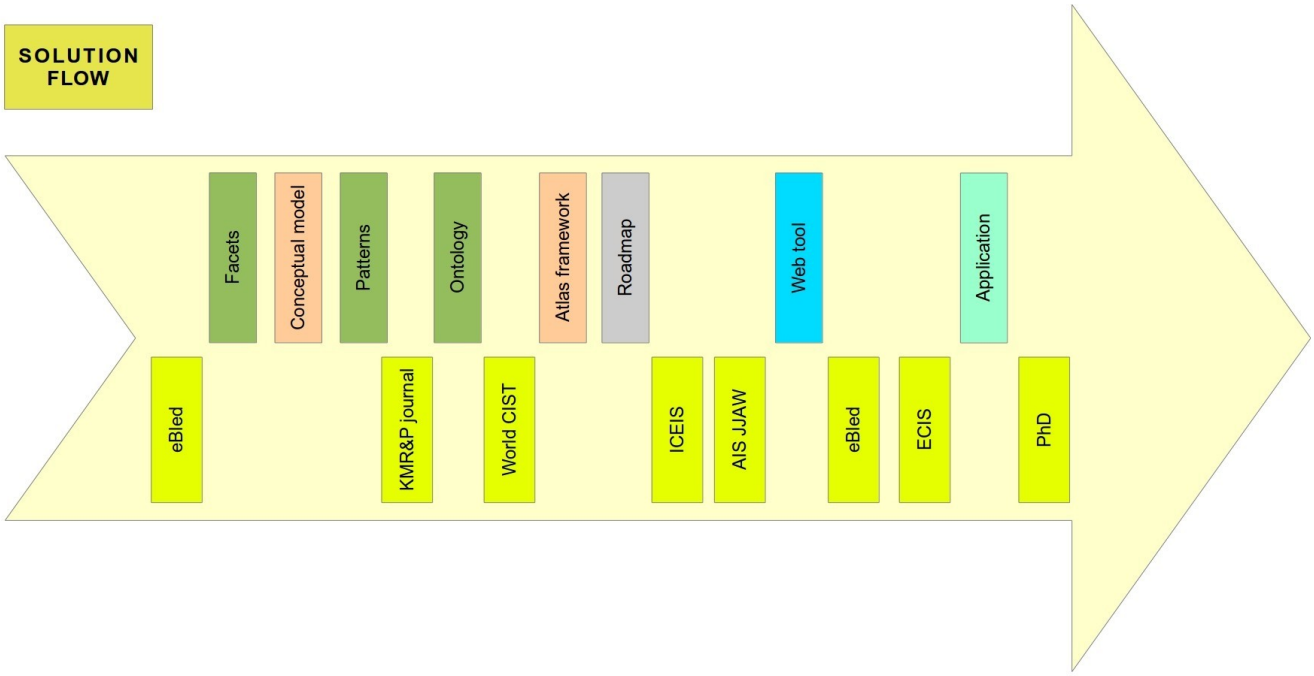

Figure 4: PhD solution flow

2.6 Conclusion

In this chapter, I have presented how the design science methodology can be used to provide a solution for development of a learning organization. The design science methodology is

appropriate for this research for the following reasons: First, it provides a frame for inclusion of a large number of aspects and issues when developing the solution. In this frame, the aspects and the issues can be organized on a ladder from more abstract outputs to more concrete instantiations. Second, it allows the usage of different methods and tools, and provides space for justification of their usage for successful delivery of different outputs. Third, this flexibility enables, and to a large extent requires from the researcher to think bottom-up and top-down regarding the outputs. Also, it provides an opportunity, at the same time, to focus on global picture and the details in order to achieve the final goal. And finally, by being able to evaluate the outputs on each level, the number of problems and issues is minimized.

However, there are two drawbacks of using the design science methodology for achieving the goal in a PhD research. First, is the time and the resources that are needed to develop the framework, because a large number of research methods need to be learned and implemented. Second, is the time and the resources needed for creating all the outputs needed for creation of a functional solution. The creation will require development of different, sometimes not related skills like ontology and programming. Lack of time and resources can also undermine the completeness of the solution.

Chapter 3

State of art

[Tyrone just backed into Franky Four Fingers' van]
Tyrone: I didn't see it there.
Vinny: It's a four ton truck, Tyrone. It's not as if it's a bag of peanuts, is it?
Tyrone: It was a funny angle.
[All three turn and look back at the truck]
Vinny: It's behind you Tyrone. Whenever you reverse, things come from behind you.

Movie “Snatch” [Ritchie, 2001]

3.1 Objective

The objective of this chapter is to present a review of the scientific literature on the learning organization. It is an attempt to create an inventory by assembling the past research on learning organization from diverse views and sources. An inventory consisting of properties, relationships, measurements and criticism, that will present a complete overview of the learning organization. The inventory will be a base on which the learning organization ontology and the framework in the next chapters will be developed.

In the first part, the design process through which the research for this chapter has been performed is presented. After that, an overview of the learning organization literature and critical discussion is made.

3.2 Methodology

The literature in this chapter was analyzed by using the "four worlds" framework developed by Jarke et al. [1993] and Rolland [1998]. This framework has been successfully used for requirements engineering [Jarke et al., 1993], process engineering [Rolland, 1998] and change engineering [Nurcan and Rolland, 2003].

The framework consists of four worlds: subject, usage, system and development.

The subject world contains the knowledge about the domain, for which the system needs to supply information. In this world, the definition and the characteristics of the learning organization are evaluated.

The system world is about the representation of the subject world. It contains the models that are related to the IT support required by the usage world.

In usage world, the goals that the actors want to achieve through the concept of the Learning organization are identified and presented. It determines the reasons why they use the system and the range of facilities they require for its usage.

The development world concerns the process that allows us to build the various models of the learning organization and the enactment of the learning organization.

Appropriate facets are identified for each world. The facet defines a particular aspect of the world. Each facet contains a set of attributes through which that particular aspect is clarified.

Furthermore each attribute has values through we are able to compare and position the approaches among them. The values of attributes can be of a predefined type (integer, boolean ...) or an enumerated type (Enum {x,y}). These relations are presented in figure 5. In the text the facet will be written as **Facet**, attribute as ATTRIBUTE and value as *value*.

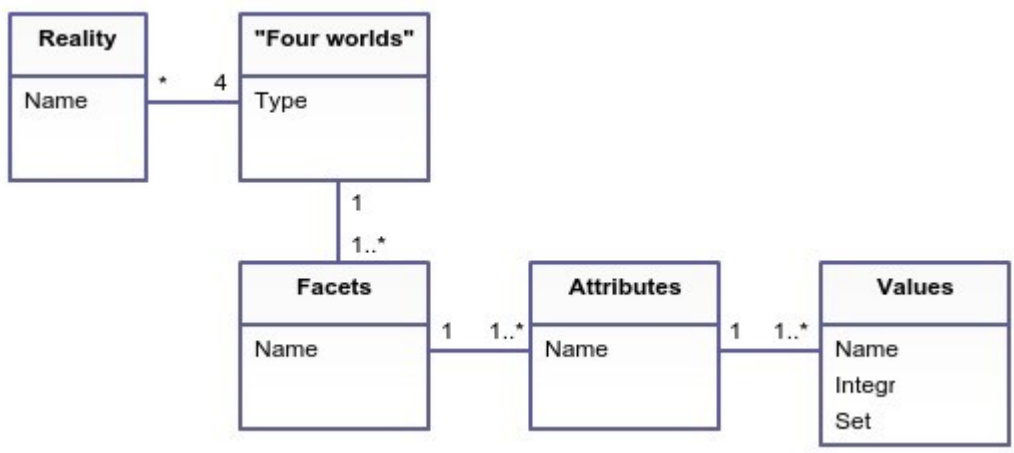

Figure 5: "Four worlds" framework relations

The literature reported in this chapter was identified and selected through a two level process. First, a pool of articles was created through a broad search in several online databases (ProQuest, Sage, Springer link, Jstor and Science Direct) by using the keywords: Learning organization concept, Learning organization definition and Learning organization characteristics. The results in each database were sorted by relevance. By applying a confidence level of 95% and confidence interval of ten, a sample size of 1037 items were identified. All the duplicates, book reviews, editorials, posters and non-English papers were eliminated. As a result, a population of 623 articles was created. By using a confidence level of 95% and confidence interval of ten, on the population of 623 selected articles, it was identified that a sample size of 83 articles was sufficient. By using random numbers the 83 articles were identified (appendix A). Through the same procedure from the journal "The Learning Organisation", as a journal devoted to LO issues, additional 54 papers were identified (appendix B). All the articles, in both samples, were reviewed and definitions, characteristics, models, methods and methodologies were identified. Then, through the second level of analysis, the original articles and books, in which the identified definitions, characteristics, models, methods and methodologies are mentioned for the first time, were reviewed and the original text was extracted.

3.3 Four worlds framework for the Learning organization

3.3.1 Subject World

The learning organization is a multidimensional construct [Yang et al., 2004]. In order to identify its facets and attributes, a useful approach is to employ Wittgenstein's notion of the family-resemblance concept, for which his classic example was the concept of games. Not all games share the same conceptual features, some are competitive, others are not. Some are team events, others are not, but they share enough constellations or families of features to enable us to call them games [Pearn et al., 1994]. Through the literature review, thirteen facets of the learning organization were identified: **Learning**, **Culture**, **Change**, **Leadership**, **Strategy, Structure, Stakeholders, Environment, Politics, Power, Systemic thinking, Processes, Technology.**

Learning

The learning properties are in the focus of the literature on learning organization. In the literature it can be noted that the terms learning organization and organizational learning were used interchangeably in the beginning of the development of the organizational learning and learning organization idea. Now, based on the work of different researchers [like Örtenblad, 2001; Yang et al., 2004], there has been made a distinction between these terms. The focus here is on the organizational learning. In total, five attributes of the learning facet are identified: TYPE OF LEARNING, STYLE OF LEARNING, LEARNING SUPPORT, LEARNING STAKEHOLDERS, UNLEARNING.

Type of learning

All organizations learn [Kim, 1993; DiBella et al., 1996; Goh, 1998], but it is argued that the learning organization needs to have embedded a more radical learning [Senge, 1990; Argyris, 1999; Garratt, 1987; Thomas and Allen, 2006]. According to Senge [1990], the more radical or generative learning emphasizes continuous experimentation and feedback in an ongoing examination of the way organizations go about defining and solving problems. By having double-loop learning an individual, organization or an entity is able to modify the goal in the light of experience, or possibly even reject the goal [Argyris, 1999]. By practicing double-loop learning the organization will be able to respond better to the rapid changes in its environment, before or after they happen.

The presence of the double-loop learning does not exclude the need to also have single-loop, adaptive or maintenance learning in the learning organization. On the contrary, the single-loop

learning must also be joined by a double-loop learning [Senge, 1990; James, 2003]. Furthermore, in order to be able to practice double-loop learning, a prerequisite is to practice single-loop learning, also to be able to practice deutero learning 3 a prerequisite is to practice single-loop and double-loop learning [Hawkins, 1991]. Actually, any subsequent level of learning transcends, but it includes its predecessors. Furthermore, in the literature the deutero-learning or level 3 is discussed, and some authors [like Watkins and Marsick, 1993] suggest that in the learning organization the learning is directed towards developing the potential for learning to learn: meta learning.

TYPE OF LEARNING: Enum{*single-loop, double-loop, deutero learning*}

Style of learning

In a learning organization every opportunity for learning should be used. Especially efforts should be made for "on the job learning" [Örtenblad, 2004]. Work and learning should be inseparably linked [Redding and Catalanello, 1994]. People should learn new skills while solving real business problems [Bennett and O'Brien, 1994]. Also, formal and informal learning approaches should be used [Watkins and Marsick, 1993], but it should be noted that only having trainings is not sufficient. Learning from own and others' experience should be also done [Marquardt and Reynolds, 1994; Bennett and O'Brien, 1994].

Although some authors have a normative approach to what learning style should be used, DiBella [1995] argues that different styles of learning can co-exist in the learning organizations. The styles can be different for different departments and hierarchical levels.

STYLE OF LEARNING: Enum{*on the job learning, training, formal, informal*}

Learning support

Besides the embedded, more radical learning what distinguishes the learning organizations from the other organizations that just learn, is that a learning organization stimulates conscious learning [Watkins and Marsick, 1993]. In this way, the quantity and quality of learning are increased [West, 1994]. Besides the encouragement the learning organizations go a step further and develop learning infrastructure [Senge, 1990], create organizations, design work, working environments, technology, rewards, systems, structures, and policies [Watkins and Marsick, 1993] that will support learning. This support is important because the organization might have individuals who learn, but if it has not developed the associated processes for capturing and retaining knowledge, it cannot be called a learning organization [Garvin, 2000]. The learning organization should be committed to providing high-quality resources for learning [DiBella and Nevis, 1998].

LEARNING SUPPORT: Enum{*conscious learning, resources*}

Learning stakeholders

In a learning organization, learning takes place at the individual, group, and organizational levels [Giesecke and McNeil, 2004]. The three levels of learning are not and should not be seen as distinct and mutually exclusive. They work together and influence each other [Redding and Catalanello, 1994]. However, in the literature there is an "individual actor bias" and the literature still emphasizes the role of individuals as active agents [Huysman, 1999]. This might be the result of seeing the individuals as the primary learning entity in the organizations [Dodgson, 1993]. On the other hand, although the individual learning is necessary, it is not a sufficient condition for organizational learning [Gould, 2000]. The later is a collective process [Watkins and Marsick, 1993; James, 2003] and the teams are the main bridges through which this process is performed. As a result of that, a lot of authors identified team learning (I would say learning through teams) as the most important feature of the learning organization [Redding and Catalanello, 1994; Thomas and Allen, 2006; Gould, 2000; Watkins and Marsick, 1993; Garvin, 1993; Senge, 1990]. Teams are the place where the rubber meets the road; unless teams can learn, the organization cannot learn [Senge, 1990]. The teams can share the knowledge better [Gould, 2000; Watkins and Marsick, 1993; Guns, 1998] and include more people in the learning process.

In the literature, it can be noticed that when the authors discuss about the organizational learning they are not referring to the learning itself, but more to managing the knowledge in order to support the learning of the individual or through teams. For example, DiBella and Nevis [1998] say that organizational learning has occurred means that new knowledge has come into the organization, has been disseminated or shared, and is or was used. In the same direction, Drew and Smith [1995] and [2004] state that organizational learning implies storing and using knowledge, thus creating the organizational memory. Other authors [like Argyris, 1999] also suggest that organizations learn when discoveries, evaluations and insights by individuals are successfully embedded in the organization's mental models or cognitive systems and memories. It is important to note that how this knowledge is gathered, stored and distributed influences on the learning within the organization [Huysman, 1999].

LEARNING STAKEHOLDERS: Enum{*individual, team, organization*}

Unlearning

Unlearning had little attention in the organizational learning literature. However, unlearning is identified as important for building a learning organization [McGill and Slocum, 1993]. There are two types of unlearning: individual and organizational [Tsang and Zahra, 2008]. According to

them, organizational unlearning is discarding of old routines to make way for new ones, if any. Unlearning at the organizational level requires unlearning at the individual level. However, the reverse may not be true. Unlearning is closely related to the organizational memory [Tsang and Zahra, 2008].

UNLEARNING: Enum{*individual, organization*}

Culture

Culture facet is one of the most interesting facets in the learning organization. It is a facet besides which, only the learning facet is discussed more. The culture facet also has strong relations with the other facets. When the authors discuss the other facets they explicitly or implicitly refer to the culture facet, and expect the changes in the culture facet to have occurred so the changes in the other facets can be realized. Davies and Nutley [2000] go even further and suggest that building a learning organization is, in effect, an attempt to manage the culture of that organization. However, what the large majority of authors agree with is that, the culture should support and encourage learning in the organization [Coopey, 1995; Giesecke and McNeil, 2004; Lundberg, 1995; Luthans et al., 1995; Marquardt, 1996; Marquardt and Reynolds, 1994; McGill and Slocum, 1993; Pedler et al., 1991; Pedler et al., 1989; Watkins and Marsick, 1993]. Through the literature I have identified four attributes of the culture facet: OPENNESS, EXPERIMENTATION, PARTICIPATION, DIALOGUE, TYPE OF CULTURE and LEVEL OF CULTURE.

Openness

People are able to share their ideas and speak without being afraid [Garvin, 2000; Silins and Mulford, 2002; Watkins and Marsick, 1993]. They will have trust between each other and speak their minds [Silins and Mulford, 2002; Davies and Nutley, 2000; Bennett and O'Brien, 1994].

OPENNESS: Enum{*openness, disclosure, sharing, trust*}

Experimentation

Seeking new things, by taking risks, in order to create a competitive advantage for the organization. The experiments should be responsible and, with calculated risk. But even with failures or mistakes made, the learning organization should accept them in order to save the curiosity and the opportunities from the experiments.

- experimentation [Coopey, 1995; Giesecke and McNeil, 2004; Goh, 1998; Pedler et al.,

1991; Slater and Narver, 1995];
- curiosity [DiBella and Nevis, 1998];
- take risks [Marquardt and Reynolds, 1994; McGill and Slocum, 1993; Giesecke and McNeil, 2004];
- accept mistakes [McGill and Slocum, 1993; Pedler et al., 1991];
- accept uncertainty [Evans, 1998; Coopey, 1995].

EXPERIMENTATION: Enum{*experimentation, curiosity, take risks, accept mistakes, accept uncertainty*}

Participation

All the employees should be able to participate and work together in order to achieve the goals. All the employees are treated equally and the vertical and horizontal barriers are eliminated.

- No barriers, egalitarian [James, 2003; Kofman and Senge, 1993];
- participation [Watkins and Marsick, 1993].

PARTICIPATION: Enum{*no barriers, egalitarian*}

Dialogue

Discussion is not sufficient; employees should get involved in a dialogue, be able to ask any type of questions and get feedback on them. After the dialogues, the employees should have time for reflection through which they will learn.

- dialogue and inquiry [Senge, 1990; Watkins and Marsick, 1993; McGill and Slocum, 1993];
- questioning [Coopey, 1995; Goh, 1998];
- feedback [Watkins and Marsick, 1993; Marquardt and Reynolds, 1994];
- time for reflection [Garvin et al., 2008].

DIALOGUE: Enum{*dialogue and inquiry, questioning, feedback, time for reflection*}

Type of culture

The development of a learning oriented culture should be supported and rewarded by the

organization [Marquardt and Reynolds, 1994; Watkins and Marsick, 1993; James, 2003; Lundberg, 1995; Goh, 1998; McGill et al., 1992]. In this way, the organization shows that it cares and that it is ready to invest in the development of the learning organization. Furthermore, it will ensure that the desired values and behavior will be accepted and will become the culture of the organization. However, having a stable dominant culture in a continually changing domain can become an obstacle, if the new culture is not ready to change again. To avoid this, the learning organization should be in the middle, between the discernible culture (little repository for learning) and the "strong" culture (reduce an organization's learning capacity) [Lundberg, 1995].

TYPE OF CULTURE: Enum{*weak, middle, strong*}

Level of culture

Majority of the literature is focused on the organizational level of the culture, but Garratt [1987], and Kofman and Senge [1993] argue that we should also take into account the influence of the larger culture and its basic dysfunctions [Coopey, 1998]. Garratt [1987] identifies four cultures that should be taken into account by the management:

- Level 4: Meta (integrating) cultures;
- Level 3: Mega (national) cultures;
- Level 2: Micro (organizational) cultures;
- Level 1: Tribal (specialist) cultures.

LEVEL OF CULTURE: Enum{*specialist, organizational, national, international*}

Change

The change aspect is continuously mentioned in the definition of the learning organization. Learning organizations are supposed to allow, not only for continuous improvement, but also major change and transformation from the learning developed [Blackman and Henderson, 2005]. There are two types of change that organizations need to make. The first one is the changes the organization needs to make to become the learning organization, and the second is the changes it makes in order to stay a learning organization. As a result the following two attributes are identified BECOMING LO and STAYING LO.

Becoming a learning organization

Developing a learning organization requires basic shifts in how we think and interact, changes

that penetrate the bedrock assumptions and habits of our culture as a whole [Kofman and Senge, 1993]. We need to change cognitive styles, deep held beliefs, attitudes, assumptions and behaviors [Dervitsiotis, 1998]. Senge [1990] says that the creation of the learning organization needs to be a decision made by the organization and not only a response to "a treat to survival". The organization needs to desire to transform to a learning organization [Daniels, 1994]. But, according to [Dervitsiotis, 1998] developing a learning organization is a rather slow process and, it can only succeed when the need for an organizational change is not urgent. The reason is that to make changes in the core of the organization is hard and it takes time. As Senge [1990] says, even the visions that are truly shared take time to emerge. The slow creation of the foundation for a learning organization contributes to a rather modest initial rate of improvement, that grows steadily and, in the late stage of becoming a learning organization, the improvement begins to accelerate [Dervitsiotis, 1998]. Taking this into account, a critical issue for an organization opting for a learning approach to transformation is the ability to reach the desired state in the time frame imposed by the realities of the competitive environment [Dervitsiotis, 1998].

Based on the previous, it can be concluded that, in order one organization to become a learning organization it needs to undergo a transformative change. On the other hand, DiBella and Nevis [1998] argue that the previously mentioned approaches assume that the organizations do not learn and, by making these changes they will learn. They suggest that the learning is inherent to the organizations, and the first step is to identify how these organizations learn and improve their genuine learning in order to become learning organizations.

BECOMING LO: Enum{*transformation, adaptation*}

Staying a learning organization

When the organization becomes, and embraces the principles and characteristics of the learning organization, it should be in a constant state of readiness, prepared not only for small-scale changes, but for change in general [Redding and Catalanello, 1994, p.110]. The learning organizations are both, more generative and more adaptive than traditional organizations [Kofman and Senge, 1993]. The continual improvement that the learning organization is aiming for [Snell, 2001; Guns, 1998] could be achieved through incremental change or/and transformation [Guns, 1998]. In the literature the accent is placed on the transformational change. For example, Watkins and Marsick [1993] suggest that the learning organizations are seeking some kind of transformational change, largely because they realize the wolf is at the door. Pedler et al. [1989] in their definition state that the learning organization will continuously transform. This continual transformation, enabled by 'generative' or 'double loop' learning, at the strategy level will initiate organizational redesign and maintenance of structural flexibility of the learning

organization [Snell, 2001].

STAYING LO: Enum{*adaptation, transformation*}

Another characteristic of the learning organization is that it quickly adapts to the changes in the environment [Swieringa and Wierdsma, 1992; Goh, 1998].

If we summarize the relation between the change and a learning organization we can say that in the beginning the organization needs to transform itself in order to become a learning organization. This transformation takes a longer period of time. When the organization becomes a learning organization, it needs to do transformational and adaptational change on a broader scope, in shorter period of time, as presented in figure 6.

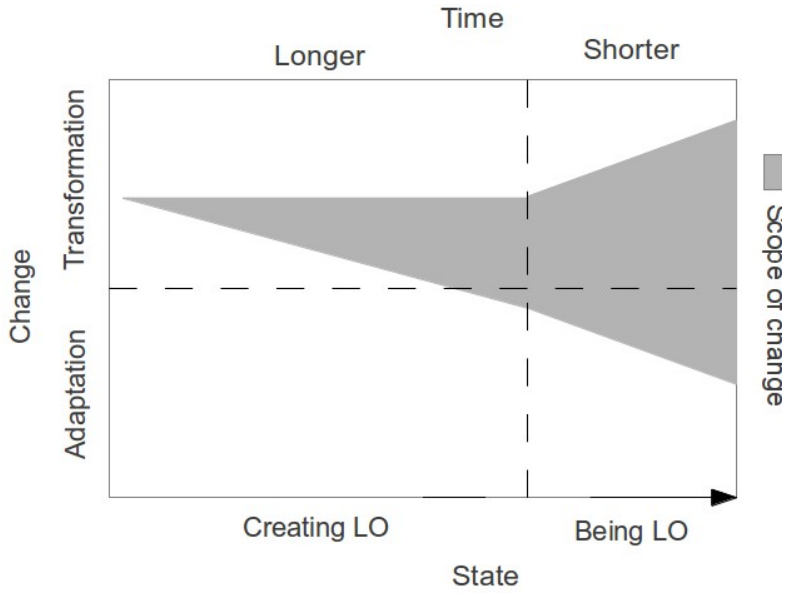

Figure 6: Learning organization and change relation

Leadership

According to the literature review, leadership is a very important facet of the learning organization. According to McGill and Slocum [1993], "the role of leadership in unlearning and learning cannot be overstated". Senge [1992] confirms this prominent position by stating that the learning organization can be created "by small groups of thoughtful leaders" and "in essence, the leaders are those building the new organization and its capabilities". If an organization does not have a leader who wants to create a learning organization, then the possibility an organization to

become a learning organization is very small [Wick and Leon, 1995; Senge, 1990]. The leadership facet has three attributes: LEADERSHIP TYPE, LEADERS' ROLE, and LEADERSHIP STYLE.

Leadership type

The learning organization cannot be created with 'hero leadership' to which we are accustomed. It requires a "servant leadership," people who lead because they chose to serve, both to serve one another and to serve a higher purpose [Kofman and Senge, 1993]. Furthermore, the leadership should not be reserved and concentrated in the top positions, but in the learning organization we should have "collective leadership" [Kofman and Senge, 1993], and create an "ecology of leadership" [Senge, 1990, p.319]. This ecology is created of leaders that can be found at any level and position in the organization [James, 2003; Senge, 1990, p.14; Goh, 1998; Marks and Louis, 1999]. For example, Nonaka [1991] identifies the mid-level managers, as team leaders, and Senge [1990, p.319] identifies local line leaders, internal network leaders, and executive leaders.

LEADERSHIP TYPE: Enum{*distributed, servant, collective*}

Leaders' role

In the learning organization literature, the relation between the leader and the vision is identified as important [Senge, 1990; Watkins and Marsick, 1993; Hitt, 1996; James, 2003; Wick and Leon, 1995]. She/he needs to have the ability to create a collective, shared vision of the future with other members of the organization [Watkins and Marsick, 1993; Senge, 1990; Hitt, 1996]. S/he needs to be a steward of the vision [Senge, 1990]. On the other hand [Wick and Leon, 1995; James, 2003], suggest that the leader, first, must have a clear and compelling vision, deeply held and consistently communicated.

The leader in the organization should identify the need for increased learning and articulate this to the organization [Johnson, 2002]. It is very important that the leaders, through their behavior and action, demonstrate their involvement and commitment to learning [Garvin, 2000, p.215; Senge, 1990, p.162; DiBella and Nevis, 1998; Wick and Leon, 1995; DiBella and Nevis, 1998]. They need to become a model that the others will follow [Senge, 1990]. The first step is the leaders to develop their own skills as learners [Garvin, 2000, p.215]. According to Argyris [1991 through Johnson, 2002], the leaders must learn how to learn. By surfacing and challenging their own assumptions and mental models [Senge, 1990], they encourage employees to do the same [Slater and Narver, 1995]. Furthermore, they need to encourage lateral, cross-functional transfers that force employees to learn and develop new skills, and share their existing skills and perspectives

with new colleagues [Nonaka, 1991]. They need to become teachers [Senge, 1990]. To achieve this, according to Goh [1998], the leaders should be seen as coaches, not controllers, provide useful feedback to employees and teams, be willing to accept criticism without being overly defensive and to learn from it. They must cultivate the proper tone, fostering desirable norms, behaviors, and rules of engagement [Garvin, 2000]. They must view everyone as an equal, including themselves [James, 2003].

The leader should also set the necessary conditions for the organization to develop an effective learning capability [Goh, 1998; Garvin, 2000; Hitt, 1996; James, 2003]. The leaders should become designers [Senge, 1990] that will design the organizational processes, structures and systems that facilitate learning at all levels [James, 2003]. Finally, in the role of designer, a leader must be willing to allow others to continue to evolve the infrastructures, to suit their own situations and, not to feel the need to control the process [Senge, 1990].

LEADERS' ROLE: Enum{*create and share vision, be a role model, provide support, be a teacher, be designer*}

Style of leadership

Regarding the style of leadership [Slater and Narver, 1995, p.69] argue that a 'complex environment calls for a complex style of leadership. [James, 2003] identifies the transformational leadership as appropriate for the learning organization. According to Bass and Avolio [1994 in Farrell, 2000], transformative leaders create the environment, in which individuals are able to learn for themselves, and share their learning experiences within the organization, both inter and intra department. In contrast, transactional leadership style occurs when the leader rewards or disciplines the follower depending on the adequacy of the follower's performance. Furthermore, [Farrell, 2000] has found that transformative leadership affects the level of learning orientation in an organization, while the transactional and laissez-faire styles did not have a statistical effect on the level of learning orientation. [Louis & Dantler, 1998 in Marks and Louis, 1999] state that paradoxically, organizational learning also requires strong and sometimes directive leadership in the articulation of organizational goals in ways that are meaningful and evocative for all participants. Finally, leaders must take a key role in "unlearning" [Slater and Narver, 1995].

LEADERSHIP STYLE: Enum{*transformational, transactional*}

An overview of the properties of leadership is presented in table 9.

Who can be a leader	What s/he should do	How s/he should do it

- Everybody	- Learn - Inspire the others to learn - Create environment for learning	- By being a role model - Through transformative leadership

Table 9: Leadership in the learning organization

Strategy

The role of planning in the learning organization is much debated, but not clearly understood [Slater and Narver, 1995]. To get a better overview of the position of the strategy in the learning organization four attributes are identified: STRATEGY DEVELOPMENT, STAKEHOLDERS, VISION, and STRATEGY OUTPUT.

Strategy development

The strategy development should be a learning-based process [Hitt, 1996; Drew and Smith, 1995; Pedler et al., 1989; Marquardt and Reynolds, 1994]. Drew and Smith [1995] see the planning as a process of double-loop (or generative) learning. The process is important because, through it alignment of the mental model with the current reality is achieved [Hitt, 1996]. This process should not be only planned, but should also be "somewhat chaotic" [James, 2003], relatively unstructured, emergent process [Slater and Narver, 1995; Thomas and Allen, 2006]. By employing a learning based process, we should be able to have a critical assessment of the key assumptions [Slater and Narver, 1995] and change the mental models [Senge, 1992]. Marquardt [1996], and Marquardt and Reynolds [1994] further present that the organization should also have a learning strategy that will make the learning a top priority of the organization. On the other hand, Davies and Nutley [2000] suggest that the strategy should also include the unlearning aspect.

STRATEGY DEVELOPMENT: Enum{*learning-based, emergent*}

Stakeholders

Stakeholders (employees, members of the organization) should be involved in the process of strategy development [Pedler et al., 1989; Watkins and Marsick, 1993; James, 2003]. It is the leader's responsibility to think how learning can be strategically used in the organization, but its members should also be involved in creating and sharing the collective vision [Watkins and Marsick, 1993]. Pedler et al. [1989] advocates strong involvement of the organization members in the process. In this direction, James [2003] states that the strategy can come from anywhere, not only from the top manager. Slater and Narver [1995] propose the top managers should primarily

provide general guidance in the process of decentralized planning. On the other hand Wick and Leon [1995] agree that the vision should be communicated with the employees, but they argue that it is the leader who creates and has a vision for the organization.

STAKEHOLDERS: Enum{*employees, managers, executives*}

Vision

Important aspect of the strategy facet is the vision. The vision should be shared, understood and supported by the employees [Marquardt and Reynolds, 1994]. Without shared visions, significant learning occurs only when there are crises and, the learning ends when the crises end [Senge, 1992]. Because of that you cannot have a learning organization without shared vision [Senge, 1990]. The creation of shared vision takes time and, its creation is a result of the interactions of the personal visions [Senge, 1990]. Teams are the core structure through which these interactions occur [Watkins and Marsick, 1993]. To enable the discussion, Nonaka [1991] suggests that the vision should be open-ended, susceptible to a variety of different and even conflicting interpretations. Besides being shared, the vision should also be challenging [Marquardt and Reynolds, 1994] genuine, should foster risk taking and experimentation [Senge, 1990].

VISION: Enum{*shared, understood, support, open-ended*}

Strategy output

Regarding the strategy output, Bennett and O'Brien [1994] propose that strategy needs to incorporate, support and promote organizational learning. While Daniels [1994] sees the individual and organizational learning as a prime means of delivery of the organizational mission in the Learning organization. On the other hand, Swiering and Wierdsma [1992] propose that the output of the learning organization should be a continuous development of the organization. According to them, the organization's strategy should have the following features: mission directed; short and medium term; rational and intuitive; active and proactive and have various focuses.

STRATEGY OUTPUT: Enum{organizational learning, continuous development}

Structure

For this facet, two attributes were identified: TYPE OF STRUCTURE and STRUCTURE CHANGE.

Type of structure

There is a strong consensus in the learning organization literature that the structure of the learning organization should not be hierarchical; although some authors recognize the presence of hierarchy in the overall structure of the learning organization [Hitt, 1996; Nonaka, 1994]. To describe the structure, which is appropriate for the learning organization, the authors use the terms organic, networked, decentralized, flat, team-based, informal, delayered [Evans, 1998; James, 2003; Swieringa and Wierdsma, 1992; Lundberg, 1995; Örtenblad, 2004; Goh, 1998; Slater and Narver, 1995; Marquardt, 1996; Swieringa and Wierdsma, 1992]. It is believed that this type of structure

- better supports the learning in the organizations [Mills and Friesen, 1992; Thomsen and Hoest, 2001];
- improves the distribution of resources to the people who need them [McGill and Slocum, 1993];
- enables better exchange of information and knowledge through the organization [McGill et al., 1992];
- promotes informal networking and socialization [Thomas and Allen, 2006];
- empowers the employees [Mills and Friesen, 1992];
- enables flexibility [Örtenblad, 2004];
- emphasizes, fosters and supports team work [Watkins and Marsick, 1993; Marquardt and Reynolds, 1994; James, 2003].

TYPE OF STRUCTURE: Enum{*non-hierarchical, networked, team-based*}

Structure change

As mentioned previously, Hitt [1996] and Nonaka [1994] state that the structure needs to be designed for both stability and flexibility. The hierarchy will provide the stability and the flat structures will provide the flexibility. In this way we create a "requisite variety" needed for an organization to become a learning organization [Nonaka, 1994].

On the other hand, Marquardt and Reynolds [1994] suggest that the Learning organization should not have a commitment to any particular structure. They need to have changing holistic structure. This structure can evolve and transform itself, based on the needs of the company. In this direction McGill and Slocum [1993] and Redding and Catalanello [1994] suggest that the structure should be seen as flexible, not as fixed. This flexibility is a result of the changes the

learning introduces and, the need for the structure to be able to shift, adapt and accommodate to these changes. This should be enabled by a mechanism of self-renewal [Mills and Friesen, 1992; Redding and Catalanello, 1994].

STRUCTURE CHANGE: Enum{*stable/flexible, self-renewal*}

Stakeholder

The stakeholder facet can be presented through two attributes: STAKEHOLDER BELONGING and STAKEHOLDER ROLE.

Stakeholder belonging

Pedler et al. [1991] argues that the learning organization should have a broader view of the stakeholders who should be included in the learning organization. They call them 'members'. Based on this broad view of them and the additional literature review, table 10 presents the different stakeholders for the learning organization.

Internal	External
• employees • managers • senior managers • leaders	• customers • competitors • suppliers • owners • other members of the environment and the community

Table 10: Stakeholders of the learning organization

STAKEHOLDER BELONGING: SET{ internal: Enum{*employees, managers, senior managers, leaders*}; external: Enum{*customers, competitors, suppliers, owners, other members*}

Stakeholder role

A characteristic that can be noticed in the literature is that the majority of authors give clear information about the roles and skills that the internal stakeholders (employees, managers, senior managers and leaders) should have. This is not the case for the external stakeholders, where the information is very brief.

It is important to note that there are some general characteristics that internal stakeholders should have:

- They need to be able to learn [McGill and Slocum, 1993];
- They need to be committed to learning [Senge, 1992].

To secure that the internal stakeholders have these characteristics, an appropriate selection and retention of the personnel should be made [Leonard-Barton, 1992].

The employees are also responsible for gathering, using and distributing the information [McGill and Slocum, 1993; McGill et al., 1992], they should be committed to the organization's mission [Nonaka, 1991; Giesecke and McNeil, 2004].

The activities of the managers are discussed more in depth in the learning organization literature. Here these activities are organized in three roles:

- supporter – models learning [McGill and Slocum, 1993]; supports information exchange [Giesecke and McNeil, 2004]; provides conceptual framework [Nonaka, 1991]; couches [Goh, 1998; Marquardt and Reynolds, 1994], does not control [Snell, 2001]; supports staff's attempts to grow and develop [Bennett and O'Brien, 1994]; balances inquiry and advocacy [Senge, 1992]; links the organization horizontally [James, 2003] and links the employees and top management [Nonaka, 1991]; facilitates learning [Marquardt and Reynolds, 1994]; distinguishes effective from ineffective practice [Garvin, 2000]; designs settings and events that prompt the necessary activities [Garvin, 2000];
- promoter – promotes constructive dissent [McGill and Slocum, 1993]; continuous improvement [Giesecke and McNeil, 2004; Goh, 1998]; personally leads the process of discussion, framing the debate, posing questions, listening attentively, and providing feedback and closure [Garvin, 2000];
- encourager – encourages experiments, acknowledges failures [McGill and Slocum, 1993]; encourages work related learning [Giesecke and McNeil, 2004]; encourages trying of new ideas [Goh, 1998]; cultivates the proper tone, fostering desirable norms, behaviors, and rules of engagement.

Senior managers are also managers, but in the literature there are some activities which are directly related to them. All these activities can be placed under one role – direction given by personal example [Nonaka, 1991; Farrell, 2000; Watkins and Marsick, 1993; Garvin, 2000]. It is essential that the top management emphasizes the importance of being learning oriented [Farrell, 2000]. To fit this role the top management should have openness to new perspectives, an

awareness of personal biases, immersion in unfiltered data, and growing sense of humility [Garvin, 2000].

Although different authors identify the external stakeholders (for example Slater and Narver [1995] call them external "learning partners") or the need for their involvement, there is almost no insight into how they can be included [Coopey, 1995]. An exception are McGill and Slocum [1993] who suggest that the customers should be part of the teaching/learning relationship, with an open, continuous dialogue.

STAKEHOLDER ROLE: SET{ employees: Enum{*learn, work with information, commit*}; managers: Enum{*supporter, promoter, encourager*}; senior managers: Enum{*direction provider*}

Figure 7 presents the previous discussion.

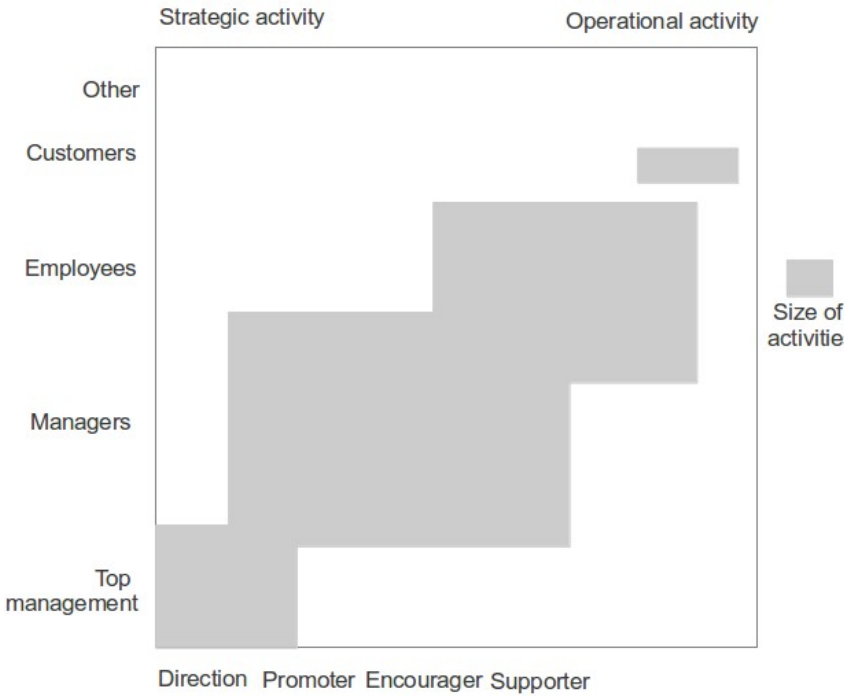

Figure 7: Stakeholder relation with the Learning organization

Environment

An important attribute of the environmental facet of the learning organization is its OPENNESS TO THE ENVIRONMENT.

Revans [cited in Garratt, 1987] argues that for an organization to survive, its rate of learning must

be equal to, or greater than, the rate of change in its external environment. His famous formula is

$$L >= C$$

To be able to achieve this, the learning organization should have, as [Watkins and Marsick, 1993] state, a healthy relationship with its physical, social and cultural environment [Watkins and Marsick, 1993]. This relationship is established through the openness to the outside world that the learning organization has [Mills and Friesen, 1992]. Through this openness, the organization is more aware of its environment [Wick and Leon, 1995], and gains accurate and insightful view of the current reality [Senge, 1990]. This should enable the organization to respond and align better to the environmental changes [Guns, 1998; Huysman, 1999; Marquardt and Reynolds, 1994].

In the literature special attention is given to the relationship with its customers. The learning organization should go beyond the simple collection of information about its customers. It should get feedback from the customers [Bennett and O'Brien, 1994] and develop a teaching/learning orientation to their relationship with the customers through an open, ongoing dialogue with them [McGill and Slocum, 1993], even court the customers [Wick and Leon, 1995]. Special attention to the customers is given by Slater and Narver [1995], who introduces the market orientation to the learning organization and the importance of communication with customers and competitors.

Regarding the competitors, Garvin et al. [2008] argues that the comparative performance is the critical scorecard, or how your organization compares with competitors or benchmark data. Based on the results of the comparative performance, the organization should get involved in enthusiastic borrowing. It is even suggested to steal shamelessly from its competitors [Wick and Leon, 1995].

The learning organization should also get involved in the community and networks with the larger business community [Marquardt and Reynolds, 1994].

To achieve this openness, the learning organization should minimize organizational boundaries [James, 2003], have mechanisms that monitor the environment [Lundberg, 1995] and continually seek data from the environment [Johnson, 2002]. This information should not only be collected via the occasional focus group, customer survey, or blitzkrieg campaign, but through a continuous conversation that enhances the experience of both parties [McGill and Slocum, 1993]. Furthermore, the learning organization must use the boundary workers as environmental scanners [Pedler et al., 1991]. According to them, scanning is carried out by all members who have contact with external customers, clients, suppliers, neighbors and so on. However, the acquisition of the information, knowledge and skill are useless unless they can be transferred to the immediate job by the employee [Goh, 1998].

OPENNESS TO THE ENVIRONMENT: Enum{*minimum boundaries, collect information from the environment, workers as boundary scanners*}

Politics

The politics facet has been largely ignored [Coopey, 1995], or it is implicit in many of the ideas, theories and prescriptions for learning and the learning organization [Coopey and Burgoyne, 2000]. As Driver [2002] states, the proponents of the learning organization (like Senge, 1990), seem unwilling even to concede that there are political processes in organizations that may undermine the humanistic vision or create the potential for abuse. Where mentioned, the political activity is seen as a pernicious means of resolving conflict [Coopey, 1995]. This is why, according to Senge [1990], internal politics is the first of many organizational "givens" challenged by prototype learning organizations. On the other hand, Coopey [1995] suggests that political processes in the learning organization should be legitimized within some sort of a democratic framework. By taking this approach, they suggest that a political perspective widens the understanding of the processes that constitute learning in organizations [Coopey and Burgoyne, 2000]. Based on the previous, I have identified the attribute TYPE OF POLITICS regarding the learning organization:

TYPE OF POLITICS: Enum{*abusive, democratic*}

Power

The power facet, although closely related to politics facet, is discussed more in the learning organization literature. An attribute identified for the power is EMPOWERMENT.

The learning organization approach to power is more humanistic and focused on sharing and distributing power. The main suggestion is that in the learning organization the employees should be empowered [Senge, 1990; Bennett and O'Brien, 1994; Örtenblad, 2004; Daniels, 1994; Marquardt and Reynolds, 1994]. Watkins and Marsick [1993] identified empowerment as the corner stone of the learning organization. According to Clegg et al. [2005], where there is no decentralized power there can be no organizational learning, thus there can be no learning organization. The need for power decentralization is a result of the learning organization's principles - everybody to be treated equally, knowledge to be shared, etc.

The benefit of the empowerment, as seen in the literature, is that the employees can make faster decisions in fast-pace-changing environment [Bennett and O'Brien, 1994; Marquardt and Reynolds, 1994]; they will take responsibility for their own work area and/or tasks and for their own career and personal development [Daniels, 1994]; they will be able to experiment and

continuously improve the organization [James, 2003]; finally through employee empowerment the organization will be empowered [Senge, 1992].

Although empowerment is strongly supported in the literature, Senge [1992] argues that empowering people should be done when the individuals are deeply aligned around a common sense of purpose and a shared vision. To empower people in an unaligned organization can be counterproductive [Senge, 1990, p.136]. In this direction, on a more operational level, Leonard-Barton [1992] says that these empowered employees have a clear sense of the operating objectives.

Although the impression from the literature is that the empowerment should be complete, Watkins and Marsick [1993] argue that empowerment is specific to a situation, not a generalized quality in a person that holds true in all circumstances. Thus, empowerment and dis-empowerment can exist side by side in the same person at the same time vis-a-vis different tasks.

Empowering is not easy. To empower requires concerted action of an organization, at many levels, in order to change deep structures and cultures that prompt people to act as they do and reward them for their success [Watkins and Marsick, 1993]. Some actions through which the employees can be empowered are [Hitt, 1996]:

- developing a shared vision;
- providing the resources needed for achieving the vision;
- delegating authority;
- celebrating successes; and most important;
- being a learning architect.

EMPOWERMENT: Enum{*distributed, inclusive, contextual*}

Systemic thinking

It can be seen that the authors of the learning organization literature include the systematic view of the organization [Luthans et al., 1995]. The systems thinking in the learning organization was accented by Senge [1990] as a commitment to seeing the larger system [Senge, 1992]. Two attributes are identified SYSTEMIC VIEW and SYSTEMIC PRECONDITIONS.

SYSTEMIC VIEW

The systematic view on the organization means:

- seeing interrelationships [Senge, 1990] and interdependencies [DiBella and Nevis, 1998];
- seeing processes of change rather than snapshots [Senge, 1990];
- awareness of time delay between actions and their outcomes [DiBella and Nevis, 1998].

Through the systems thinking, the employees should be aware how the macro systems and structures influence their work and vice versa, how their work influences the macro systems and structures [James, 2003]. They should be able to identify the reciprocal flow of influence between micro and macro [Senge, 1990]. This is achieved by using the feedback process that can reinforce and balance. In this way, they will be able to see the "structures" that underlie complex situations and this leads to a new insight into what might be done [Senge, 1990].

SYSTEMIC VIEW: Enum{*interrelationships and interdependence, process rather than snapshot, delay*}

SYSTEMIC PRECONDITIONS

At the end, it should be noted that according to Senge, the systemic thinking of the organization

- only matters when there is a commitment to the long-term [Senge, 1992];
- without the discipline of mental models loses much of its power [Senge, 1990];
- becomes an active daily agent only when managers start thinking in terms of the systems archetypes [Senge, 1990].

SYSTEMIC PRECONDITIONS: Enum{*commitment to long term, mental models, thinking in systems archetypes*}

Processes

The processes are the place where "the rubber meets the road". A noticeabe feature in the learning organization literature is that it is more discussed about the conditions and outputs than about the processes [Huysman, 1999]. But, some others [like McGill et al., 1992] say that that re-framing an organization's approach to its environment must be an internal re-framing of processes and managerial practices that put these ideas into action.

PROCESS: Enum{*purpose, input, output*}

Technology

The technology in the learning organization is primarily discussed through the prism of

information and communication technologies. The main reason for this is that learning is closely connected to data, information and knowledge. The main conclusion, found in different articles and nicely presented by McGill and Slocum [1993], is that a learning organization is effective to the degree that the information it learns from is accurate, timely available to those who need it, and presented in a format that facilitates its use. Goh [1998] argues that skill and knowledge acquisition are useless unless they can be transferred to the immediate job by the employee, or transferred to other parts of the organization to solve problems and energize creative ideas. Learning organizations contain systems and processes for sharing knowledge and information [Johnson, 2002]. At the center of these systems and processes is the advanced technology [Bennett and O'Brien, 1994]. Through it successful learning organizations elicit, code, store, and create knowledge [Marquardt and Reynolds, 1994]. Technology is critical to the effective capture of organization knowledge [Thomas and Allen, 2006]

By performing the above mentioned activities, technology should support the learning in the organization [Pedler et al., 1991; Watkins and Marsick, 1993], but it is important to remember, though, that technology is an adjunct to faster learning, not the driving force behind it [Guns, 1998]. In this direction, by focusing too much on the technology the authors in the literature tend to overlook the more accidental and path-dependent nature of organizational learning [Huysman, 1999].

TECHNOLOGY: Enum{*advance, actor concrete, adjunct*}

3.3.2 Usage world

In usage world the goals that the actors want to achieve, through the concept of the Learning organization, are identified and presented. Furthermore, it presents the research which identifies the application of the learning organization. As a result, two facets are identified: **Goal** and **Application**.

Goal

Regarding the facet goal three attributes were identified: PERFORMANCE, COMPETITIVENESS, and KNOWLEDGE.

PERFORMANCE

Some authors relate the output of the learning organization to the performance of the organization. Thomas and Allen [2006] identify that the intent of the Learning organization is to maintain or improve its performance. According to Marquardt and Reynolds [1994], this improvement should be continuous, while Guns [1998] suggests that it should be a long term

performance. While some authors do not state what they mean by improved performance, like Marks and Louis [1999], who suggest that people in the organization should reach an agreement on a clear set of performance benchmarks, Hitt [1996] proposes organizational excellence, and Marquardt and Reynolds [1994] the quality as an output. Johnson [2002] has identified that organizational effectiveness is the ultimate desired outcome.

PERFORMANCE: Enum{*continuous improvement, excellence, quality, effectiveness*}

COMPETITIVENESS

The competitive advantage, as the output of the learning organization was identified by Pedler et al. [1989] by stating that "without exception our interviewees cited competitive advantage as the main reason for their interest". Slater and Narver [1995], by applying market orientation to learning organization, suggested that the output is the customers' satisfaction, sales growth, new product success, profitability. In this direction, Bennett and O'Brien [1994] say that the value of learning lies in its ability to help the organization to serve its customers better. Watkins and Marsick [1993] identify innovation, and Örtenblad [2004] flexible action, as the ultimate outcome of a true learning organization.

COMPETITIVNESS: Enum{*better service, flexible action, innovation*}

KNOWLEDGE

Other authors have identified the knowledge as final [Redding and Catalanello, 1994; Marquardt and Reynolds, 1994] or intermediate output [Blackman and Henderson, 2005]. The new knowledge [Blackman and Henderson, 2005] creates the transformational change and competitive advantage as the final outputs of the learning organization.

KNOWLEDGE: Enum{*new, intermediate*}

A note should be placed here that there is an optimistic approach to the outputs of the learning organization. This might be a result of the optimistic link between learning and improvement. But, as learning does not necessarily result in positive outcomes, so the output of the learning organization might be negative [Huysman, 1999].

Application

Through this facet a review of "where and when the learning organization theory has been applied" is performed. The review shows interesting information: in all books identified to show

examples of the learning organization, the authors, as sources use interviews, information from other sources and personal experience. Furthermore, these sources are used to identify the learning organization requirements and how they can be achieved [Marquardt, 1996; Redding and Catalanello, 1994; Watkins and Marsick, 1993; Kline and Saunders, 2010; Garvin, 2000; Senge, 1990]. On the other hand, the journal articles identify a sample, and mainly through surveys try to evaluate the learning organization characteristics. On a smaller scale, interviews [Pedler et al., 1989; Smith and Taylor, 2000; Jamali et al., 2009] and case studies [Johnson, 2002] are used. The attributes of this facet are based on Wacker [2008] characteristics of the sample: COUNTRIES, INDUSTRIES, RESPONDENT'S POSITION, and RESPONDENTS' DEMOGRAPHICS.

COUNTRY

On a country level, the focus of research is mainly on USA and UK, or international companies from USA and Europe; although there is research performed in other countries like Lebanon [Jamali et al., 2009], Finland [Moilanen, 2005], Iran [Vatankhah et al., 2011], China [Zhang et al., 2004], Korea [Song and Chermack, 2008], Jordan [Khadra and Rawabdeh, 2006], Taiwan [Lien et al., 2006], Norway [Filstad and Gottschalk, 2011], Malaysia [Ali, 2012].

COUNTRY: Enum{*developing, developed*}

INDUSTRY

Regarding the industries there is no concrete focus. The research has been performed in different type of industries

- services, like banking, insurance, IT, postal, telecommunications, transportation;
- manufacturing, in the automobile, airplane, petrochemical, network equipment, mining;
- public, like various public sector institutions, police, universities, health institution.

INDUSTRY: Enum{*services, manufacturing, public*}

RESPONDENT'S POSITION

In the research there is a slight focus on the top executive [Garvin et al., 2008; Pedler et al., 1989; Davis and Daley, 2008] and mid level management [Ellinger et al., 2002; Zhang et al., 2004; Filstad and Gottschalk, 2011]. The other identified research targets all levels [Jamali et al., 2009; Yang et al., 2004; Moilanen, 2005; Vatankhah et al., 2011; Goh and Richards, 1997; Song and Chermack, 2008; Lien et al., 2006; Phillips, 2003]. Johnson [2002] has focused on the leaders in the organization.

RESPONDENT'S POSITION: Enum{*top executives, middle managers, employees*}

RESPONDENTS' DEMOGRAPHICS

Besides the questions regarding the learning organization, most of the articles do not present other demographic information for the respondents. In a small number of papers, demographic information regarding the age, gender, years of experience, years of education are presented.

RESPONDENT'S DEMOGRAPHICS: Enum{*age, gender, experience, education*}

It is important to note that the sample in all the books is non-random. In some of the articles, the authors have conveniently selected the organization sample and then the respondents are selected randomly, for example [Jamali et al., 2009; Smith and Taylor, 2000; Song and Chermack, 2008; Ali, 2012]. Exceptions are authors who used a randomly selected sample [Ellinger et al., 2002; Khadra and Rawabdeh, 2006; Davis and Daley, 2008]. Others have used convenience sample [Filstad and Gottschalk, 2011; Lien et al., 2006; Phillips, 2003; Zhang et al., 2004].

3.3.3 System world

The system world is about the representation of the subject world and the IT support of the user world. Questions that need to be answered in this world are:

- what is to be represented?
- at what level of abstraction?
- how is it represented?
- what properties should the representation have?

This resulted in an identification of the facets of the system world for the learning organization: **Content**, **Model**, **Languages** and **Metrics**.

Content

The learning organization is a complex entity that involves all the aspects of the organization. However, the existing models and solutions significantly reduce this complexity. As a result, the current solutions are not useful for the managers and executives [Grieves, 2008]. Based on the identified challenges in the literature, that the learning organization has: a large number of facets, attributes and variables that construct the learning organization [Yang et al., 2004] ; complex relationships within and between the facets [Grieves, 2008] ; the learning organization is not a state, it is a chameleon-like target that is continuously changing [DiBella, 1995] ; and each

organization is different and each needs to find its own path in becoming a learning organization [DiBella, 1995; Redding, 1997] the system that will represent it should take into account the following attributes: LAYERS, ECOLOGY and STAKEHOLDERS.

LAYERS

The learning organization consists of number of layers partly related to enterprise architecture. To represent the organization the systems should take into account, first, the *hard aspects* of the organization like physical infrastructure, technology infrastructure, tools that it uses, organizational structure, and documentation that it creates. Second, the soft aspects of the organization like culture, learning, change should also be represented. An additional aspect that should be represented are the interactions between them.

LAYERS: Enum{*hard aspects, soft aspects, interactions between them*}

ECOLOGY

The learning organization is ecology of elements. Each organization is composed of individuals, who can work in different teams in different units of the organization that is surrounded by an external environment. This ecology needs to be represented because of the unique needs each element has.

ECOLOGY: Enum{*individual, team, unit, organization, environment*}

STAKEHOLDER

In the learning organization, due to the presence of roles and structural levels, different types of stakeholders are identified. As presented in the subject world, each of these stakeholders has its own roles and activities that s/he performs in the learning organization. As a result of this, the system must represent the needs and the roles of the different stakeholders in the organization. Stakeholders that it needs to represent are employees, managers, executives, customers, suppliers, competitors, governmental stakeholders.

STAKEHOLDER: Enum{*employees, managers, executives, customers, suppliers, competitors, government*}

Models

The models allow us to understand the subject world using several levels of abstraction (or levels

of details). Based on the work of Gmati and Nurcan [2007] I propose the attributes: STRUCTURAL, BEHAVIOURAL, SCENARIO and FLEXIBILITY.

STRUCTURAL

Through this attribute, the structure of the model is determined. The structure determines the fixed part of the model that should be presented. The attributes are: actor, object, relations. The actors represent the humans, living beings, in or out of the organization who will interact with the system by providing input and/or using the output of the system. On the other hand, the objects are the representation of things in reality. They are abstractions of reality in a target-oriented manner. Similar objects will be combined into classes. Through the relations, links between actors, objects and classes are created. These relations can represent associations, generalizations, or dependencies.

STRUCTURAL: Enum{*actor, object, relations*}

BEHAVIORAL

The behavioral attribute of the model represents the "life cycle" of the elements in the structural model. Through their "life cycle" the elements, as a result of various events, take certain states that produce certain events. This flow is governed by predetermined processes.

BEHAVIORAL: Enum{*events, states, processes*}

SCENARIO

The behavior determines the routes and the predicted end-stations of the model, while by using scenarios, Rolland et al. [1998] the real movement through the model is selected. Values of the scenario attribute are Goals, Rules, and Decisions. The scenarios are a result of different goals that different actors want to achieve. The paths that can be taken in a scenario are defined by rules, while the actual paths taken are determined by decisions made by the actors.

SCENARIO: Enum{goals, rules, decisions}

FLEXIBILITY

Gmati and Nurcan [2007] identified that the IS should be flexible and has the ability to adapt to the content changes. Based on their work, four values for this attribute are presented: modularization, capability to reuse existing components, identify triggers, and embed change.

The modularization enables decomposition of the model into significant chunks that can be better understood by the user and be re-used. By reusing the existing components, the model can be made more flexible and easier to adjust to the changes, because it will not need to build from a scratch. Also, other models can be built by re-using parts of older models. The models should also be able to change, based on the internal and external changes. The triggers should enable the model to detect these changes and initiate a change of itself.

FLEXIBILITY: Enum{*modularization, capability to reuse existing components, identify triggers, embed change*}

Languages

The language that existing LO literature is using is non-formal and full of ambiguous and vague terms. By attaching different meanings to the terms, the development of the framework can be neglected. A strong requirement for development of the LO in general is the usage of a more formal language in describing the LO. This should be followed by a usage of formal languages for development of the framework. A language that can be considered appropriate for this task is UML (Unified Modeling Language).

LANGUAGE: Enum{*formal, non-formal*}

Metrics

The presence of metrics should help us to evaluate the results of our models. Huysman [1999] states that the learning organization creates positively valued outcomes. A lot of diagnostics instruments have been developed like: Learning company blueprint [Pedler et al., 1991], Dimensions of the Learning Organization Questionnaire [Watkins and Marsick, 1993; Yang et al., 2004], Learning organization profile [Marquardt, 1996], Organizational Learning Survey [Goh and Richards, 1997], and the Learning organization survey [Garvin et al., 2008]. They all evaluate the attribute PERFORMANCE. Values for this attribute are: planned, realized, financial.

PERFORMANCE: Enum{*planned, realized, financial*}

3.3.4 Development world

The development world concerns the process that allows us to build the various models of the learning organization and the enactment of the learning organization.

Development approach

When we are developing the learning organization information system, our approach should ensure that the framework would be able to adequately cope with the complexity of the organizational life it needs to represent. Two attributes are identified for this facet that should enable the appropriate development: DEVELOPMENT and INSTANTIATION.

DEVELOPMENT

In the literature, strongly recognized characteristic of the learning organization is the need for development. This development results in creation of different levels of development of the organization. For example, the levels of learning are: no learning, single-loop, double-loop and deutero learning [Argyris, 1999]. In order to move from single-loop to double-loop learning, change needs to happen. To be able to change, fast or slow, the option for flexibility needs to be represented. However, not everything needs to change; some aspects might need to stay the same, while others change. This can be achieved through representation of modularization. Furthermore, the next level should not completely disregard the previous state, but it should embed it in the next level.

DEVELOPMENT: Enum{*levels, change, flexibility, modularization, embedding*}

INSTANTIATION

The literature does not see the learning organization as a state that can be achieved, but as the Holy Grail [Jashapara, 1993], “snark” [Tosey, 2005], a continuous journey. This is also one of the strongest criticisms to the learning organization. To avoid this issue with the framework, it is important to create instantiations. Furthermore, the instantiations would create an option for improvement of the framework and the concept of LO overall.

INSTANTIATION: Enum{*yes, no*}

3.4 Conclusion

In this chapter analysis of the learning organization literature has been done. To achieve this, the four-world framework was used. The result is a structured overview of the existing research on the learning organization (Table 11). The analysis through the 'four-world' framework revealed that the majority of the research presented in the literature is about the subject and usage world, while the system and, especially, the development world are symbolical. This is in line with the identified problems in the Introduction chapter, and it is also a justification for the decision to develop a framework for continuous transformation to a learning organization. On the other hand, the facets, their attributes and values create an appropriate base for development of the ontology

and the framework.

	World	Facet	Attributes	Values
Learning organization	Subject	Learning	Type of learning	single-loop, double-loop, deutero learning
			Style of learning	on the job learning, training, formal, informal
			Learning support	conscious learning, resources
			Learning stakeholders	individual, team, organization
			Unlearning	individual, organization
		Culture	Openness	openness, disclosure, sharing, trust
			Experimentation	experimentation, curiosity, take risks, accept mistakes, accept uncertainty
			Participation	no barriers, egalitarian
			Dialogue	dialogue and inquiry, questioning, feedback, time for reflection
			Type of culture	weak, middle, strong
			Level of culture	specialist, organizational, national, international
		Change	Becoming LO	Transformation, adaptation
			Staying LO	Adaptation, transformation
		Leadership	Leadership type	Distributed, servant, collective
			Leaders' role	Create and share vision, be a role model, provide support, be a teacher, be designer
			Leadership style	Transformational, transactional

		Strategy	Strategy development	Learning-based, emergent
			Stakeholders	Employees, managers, executives
			Vision	Shared, understood, support, open-ended
			Strategy output	Organizational learning, continuous development
		Structure	Type of structure	Non-hierarchical, networked, team-based
			Structure change	Stable/flexible, self-renewal
		Stakeholders	Stakeholder belonging	Internal: employees, managers, senior managers, leaders External: customers, competitors, suppliers, owners, other members
			Stakeholder role	Employees: learn, work with information, commit; Managers: supporter, promoter, encourager; Senior managers: direction provider
		Environment	Openness to the environment	Minimum boundaries, collect information from the environment, workers as boundary scanners
		Politics	Type of politics	Abusive, democratic
		Power	Empowerment	Distributed, inclusive, contextual
		Systemic thinking	Systemic view	Interrelationships and interdependence, process rather than snapshot, delay
			Systemic preconditions	Commitment to long term, mental models, thinking in systems archetypes
		Processes	Processes	Purpose, input, output

		Technology	Technology	Advance, actor concrete, adjunct
	Usage	Goal	Performance	Continuous improvement, excellence, quality, effectiveness
			Competitiveness	Better service, flexible action, innovation
			Knowledge	New, intermediate
		Application	Countries	Developing, developed
			Industry	Services, manufacturing, public
			Respondent's position	Top executives, middle managers, employees
			Respondents' demographics	Age, gender, experience, education
	System	Content	Layers	Hard aspects, soft aspects, interaction between them
			Ecology	Individual, team, unit, organization, environment
			Stakeholders	Employees, managers, executives, customers, suppliers, competitors, government
		Model	Structural	Actor, object, relations
			Behavioral	Events, states, processes
			Scenario	Goals, rules, decisions
			Flexibility	Modularization, capability to reuse existing components, identify triggers, embed change
		Languages	Language	Formal, non-formal
		Metrics	Performance	Planned, realized, financial

	Development	Development approach	Development	Levels, change, flexibility, modularization, embedding
			Instantiation	Yes, no

Table 11: Learning organization 'four worlds'

Mijalce Santa

Chapter 4

The Learning Organization Ontology

Avi: Should I call you Bullet?
Bullet Tooth Tony: You can call me Susan if it makes you happy.

Movie “Snatch” [Ritchie, 2001]

4.1 Objective

The learning organization concept is still an elusive concept; it is full of vague and ambiguous terms, and poorly defined relations between the elements. Ontology is an explicit specification of a shared conceptualization [Gruber, 1993]. Through ontology, explicit terms and definitions are given to the concepts and relationships of the abstract model [Gruninger and Lee, 2002]. Ontologies are useful because they explicate components that define a phenomenon and, thus, can help in systematically understanding or modeling that phenomenon [Holsapple and Joshi, 2004]. In this way we can contribute to the creation of shared understanding about the learning organization concept [Sicilia and Lytras, 2005]. Thus, the ontology will provide one set of defined terms and relations that will accurately cover the concept of the learning organization. In the context of building an IT system, the ontology will contribute to (Uschold and Gruninger, 1996):

- better requirements identification and; thus, in defining of a specification of the system;
- improvement of interoperability;
- increase of the potential for re-use and sharing;
- as a consequence of the above, less effort being wasted for re-inventing the wheel.

According to [Gruninger and Lee, 2002] the uses of the ontology can be:

- for communication;
- for computational inference;
- for reuse (and organization) of knowledge.

They suggest that the rigorous formal ontologies are developed by consortia and standards organizations. On the other hand, this is not a necessity for the lightweight ontologies. Furthermore, according to Davies [2010] lightweight ontologies are easier to understand, adapt, manage, update, and use. Based on the previous, the objective of this chapter is to develop a lightweight learning organization ontology.

4.2 Lightweight ontology

Lightweight ontologies typically consist of a hierarchy of concepts and a set of relations holding between those concepts [Davies, 2010]. However, based on their usage, there are two main types of lightweight ontologies: descriptive and classification lightweight ontologies [Giunchiglia and

Zaihrayeu, 2007]. Descriptive lightweight ontologies are primarily used for defining the meaning of terms, as well as, the nature and structure of a domain [Guarino, 2004] to capture the more commonsensical and social notions based on natural language usage and human cognition [Obrst, 2010]. Thus, in descriptive ontologies, concepts represent real world entities (e.g., the extension of the concept animal is the set of real world animals) [Giunchiglia et al., 2009].

Based on the proposal of Mika (2005), the learning organization lightweight ontology should minimize the difficulty for users of adapting to the ontology. Furthermore, it can be used as a base on which later on, a classification lightweight ontology can be created (Giunchiglia and Zaihrayeu, 2007) and be used for the development of heavyweight ontology (Davies, 2010).

The ontologies are inseparable from the context of the community in which they are created and used. Developing the ontology from its context can have only benefits to bring in terms of more meaningful and easily maintainable conceptual structures [Mika, 2005]. To create the context, the researchers go through an extensive process of consultation with stakeholders and, based on that they provide the ontology [Hoehndorf et al., 2011; Holsapple and Joshi, 2004]. However, in this PhD the context is based on the state of the art chapter and the outputs from it. The consultation with the academic community and verification of the ontology is done by publishing the paper "Descriptive Lightweight Learning Organisation Ontology" at the WorldCIST academic conference [Santa and Nurcan, 2014b].

In order to identify and present the learning, vision, strategy, power, politics, culture, technology, structure, processes, change and leadership element, a pattern oriented modeling (POM) was applied [Grimm and Railsback, 2012]. POM aims to "decode" the internal information about the system that the patterns contain [Grimm et al., 2005]. The patterns provide the defining characteristics of the concept and indicators of the essential underlying processes and structures. The goal is to produce 'structurally realistic' models that capture, in a simple yet useful way, the system's generative mechanisms – the internal organization and processes that generate the system's responses [Grimm and Railsback, 2012].

4.3 Learning Organization Conceptual Model

The first step in POM is to provide a guiding structure of the model [Grimm and Railsback, 2012]. The conceptual model should be simple and include only the necessary elements. Based on the state of art literature, a Learning organization conceptual model has been developed (Figure 8) by Santa and Nurcan [2014c]. The model consists of eleven facets[3]. Learning is identified as a central facet while the others are grouped into four pillars: direction, informal,

3 Different than the facets used in the "four worlds" model

infrastructure and change. The direction pillar guides the learning organization and shows where the organization wants to be in the future. It consists of a strategy and vision. The informal pillar presents the non-visible aspects of the organization that influence how the individuals and the organizations see and approach reality [Senge, 1990]. It consists of culture, power and politics. The infrastructure pillar contains facets that support and constrain learning in the organizations. It consists of a structure, technology and processes. The facets of the change pillar enable the changes in the learning organization by influencing all the other facets in the learning organization. It consists of leadership and change. The relations in Figure 8 show that the elements influence each other and, that there is a feedback process that enables continuous change and learning in the organization based on the new or modified directions identified by the organization. The dashed line represents the continuous influence and interaction of the environment with the learning organization. The reasons for not including all the facets identified in the state of art chapter into the learning organization conceptual model are: the facet stakeholders and environment are used as lenses in the learning organization atlas framework [Santa and Nurcan, 2013]; the facet politics due to very low coverage in the learning organization literature is incorporated into the power facet; and the facet systems thinking is used as a principle for development of the framework [Santa and Nurcan, 2014a].

The model has two unique characteristics: first, introduction of the vertical axis of invisible and visible aspects of the learning organization; second, positioning the direction pillar in the two places in the model.

- The vertical axis acknowledges and informs the model reader that each element in the model at the same time consists of invisible and visible aspects. The position of each element on the axis is based on the literature review and indicates in which elements which aspects have stronger presence;
- By positioning the direction pillar in two places, we acknowledge the importance of the vision and strategy elements in the development of the learning organization. The direction can be a result of the leadership and the changes in the organization; and then influence the content of the elements in the informal, learning and infrastructure pillar. However, the Direction is also a result of the influences of the informal, learning and infrastructure pillar. Through the feedback, it is demonstrated that new identified directions initiate changes that could initiate new directions. In this way, the heterogeneity of reasons for development and determination of the vision and strategy in the learning organization is presented.

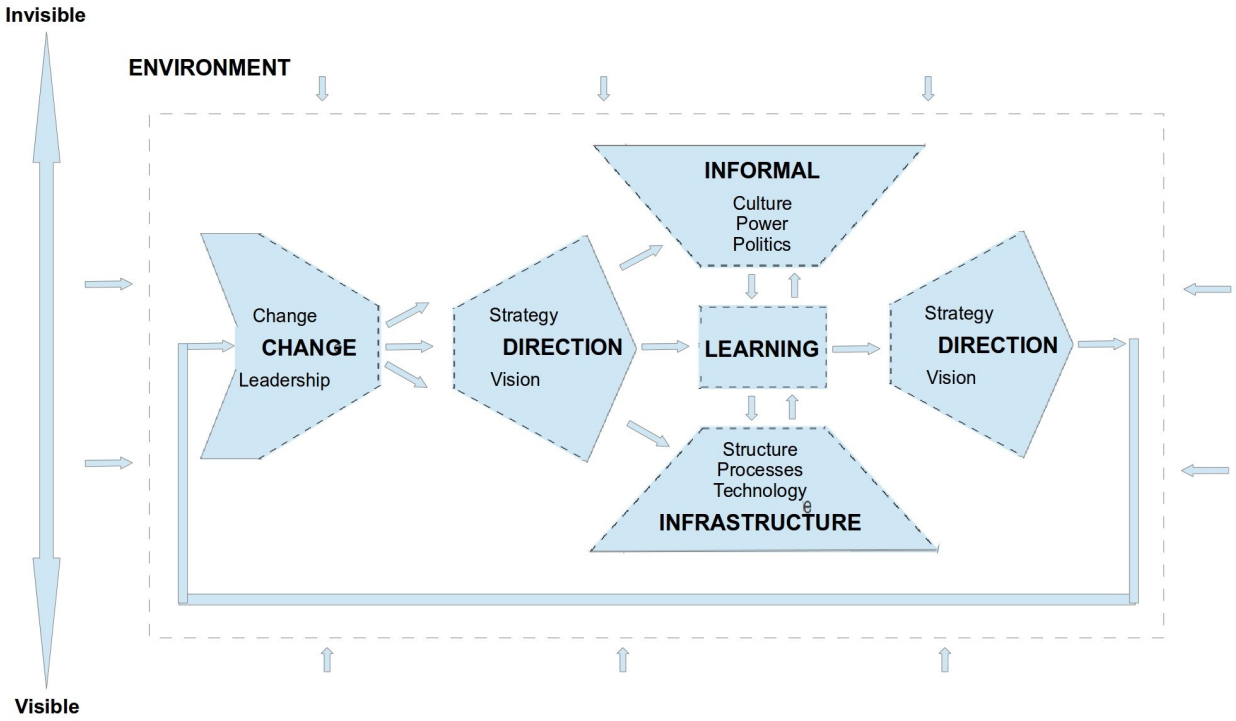

Figure 8: Learning organisation conceptual model

4.4 Learning Organization Patterns

Based on the learning organization conceptual model, we move forward with developing the learning organization patterns. Patterns are defining characteristics of a system and often, therefore, indicators of essential underlying processes and structures (Grimm et al., 2005). In this way, we can contribute to the creation of shared understanding about the learning organization concept. Furthermore, the patterns can contribute to overcoming the dichotomy between the prescriptive writing on learning organization and descriptive writing on organizational learning (Tsang, 1997). The patterns provide a descriptive understanding of the relationships between the elements, while the identified generative mechanisms provide the prescription. In the context of building an information system, the patterns will contribute to better requirements identification and; thus, in defining the specification of the system. To make this achievable, as much as it is possible, the description, based on the literature review and the developed patterns will be presented in parallel. The following UML notation is used for pattern diagrammatic representation (Hay, 2011):

- Entity classes are used to represent things through rectangles. Things can be tangible like individuals or abstract like roles;
- The relationships between the things are shown as annotated lines;
- The optionality and cardinality are shown by the expression of <min>...<max>;
- The reading of the diagrams is done in the following sequence Cardinality – Thing – Relation Name – Cardinality – Thing.

Learning

Learning is processing of information and knowledge that results in - realized and potential change of behaviour [based on the work of Argyris, 1999; Senge, 1990; Watkins and Marsick, 1993]. In a learning organization, learning takes place at the individual, team, and organizational level [Karp, 2006]. The three levels work together and influence each other [Kofman and Senge, 1993]. Furthermore, these three levels are surrounded with an environment that also learns. The environment can be separated to direct environment (competitors, suppliers, governmental institutions) and general environment (culture, politics, social aspects). The Learning Entity element (Figure 9) represents these levels through the sub-classes Person, Team, Organization, Direct environment and General environment. However, there could be additional learning entities like Dyad (for example: partners in Police Force) or Departments, Strategic units etc. To enable the flexibility in introducing a new Learning Entity, the Learning Entity Type element is developed. The Learning Entity Type is defined as a definition of a kind of Learning Entity. The relations between them are that "each Learning Entity Type may be represented in one or more Learning Entities and each Learning Entity must be an example of one and only one Learning entity type". Furthermore, the relations between the Learning Entity Types are represented by the assertion that "each Learning Entity Type may be embedded in (alternatively: embed) none or more Learning Entity Type". For example, Individual is embedded in Team, but Individual doesn't embed anything.

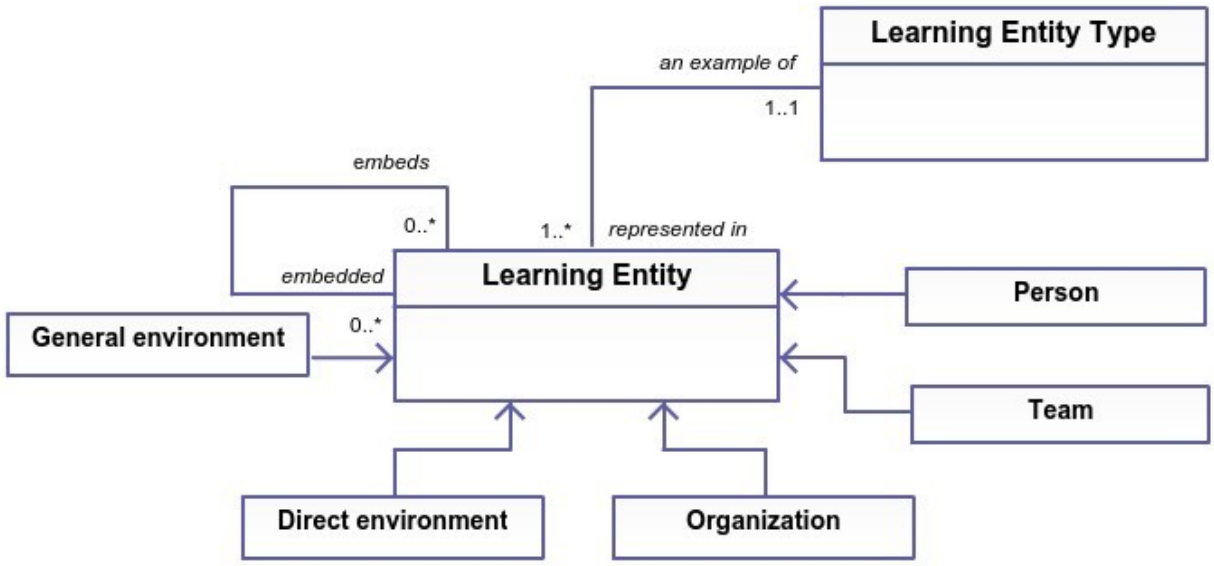

Figure 9: Learning Entity element

EXAMPLE: The person "John Day" is part of the operational team that is part of the "Ajax" organization. He is also part of the manufacturing department that is part of the "Ajax" organization.

The individual has learned only when there is action [Argyris, 1999; Kim, 1993; Senge, 1990]. If there is no action, through demonstrated learning, there is no learning [Swieringa and Wierdsma, 1992]. On the other hand, organizational learning has occurred when new knowledge has come into an organization, has been disseminated or shared, and is or was used [DiBella, 1995]. The teams can share the knowledge better [Gould, 2000; Guns, 1998; Watkins and Marsick, 1993] and include more people in the learning process. As a pattern, we can say that to carry out a Learning Activity each Learning Entity needs to play a certain Learning Role (Figure 10). The Learning Role presents how a certain Learning Entity is involved in a certain Learning Activity. The relations between them are that "each Learning Entity may be a player of one or more Learning Roles" and "each Learning Role can be played by one and only one Learning Entity". These relations are constrained by the rule that certain Learning Roles can be played only by a concrete Learning Entity. For example: Person can play the role of Learner and Teacher, while Teams can play Sharing role, and Organization can play the Collection role.

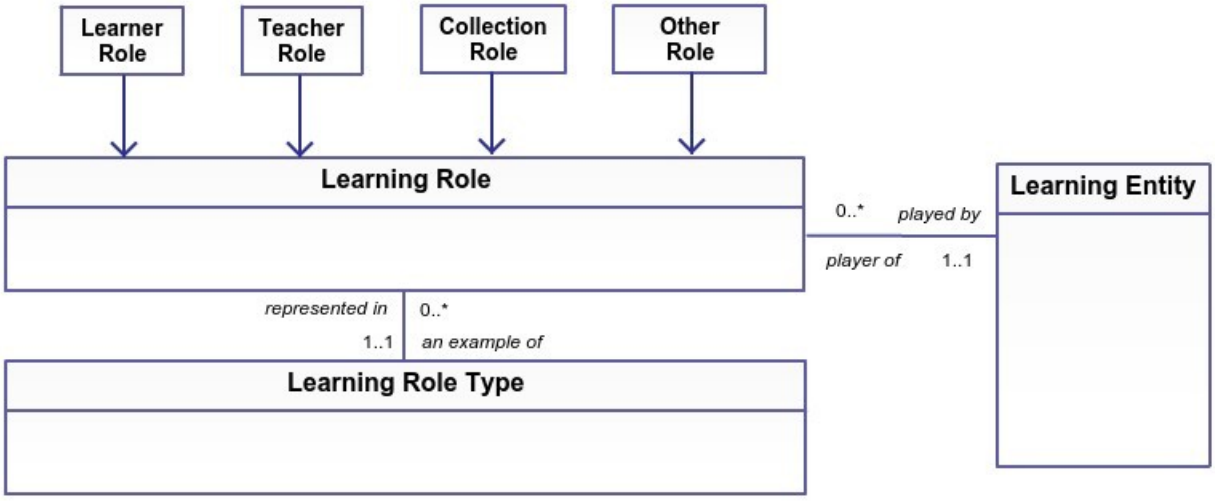

Figure 10: Learning Role element

A Learning Activity (Figure 11) is an activity through which a Learning Entity learns. Learning Activities are managed by the Learning Roles that the Learning Entity takes. The relations are that "each Learning Activity is managed by one Learning Role" and "each Learning Role manages one or more Learning Activities".

Additional elements are Trigger and Event. "Each Learning Activity can be caused by one or more Triggers" or "each Learning Activity can be a result of one or more Events". Furthermore, there are relations between the Trigger and the Event element. First, “each Trigger may be caused by one and only one Event” and “each Event may be the cause of none or more Triggers”. Second, “each Trigger may be the cause of none or more Events” and “each Event may be caused by one or more Triggers”.

EXAMPLE: A new machine has arrived in the company (Internal Event) that requires (Trigger) an employee (Learning Entity) to learn new skills (Learner Role) by following a new course (Learning Activity). Then, when he is back to the company, he needs to share his knowledge with the other employees (Teacher Role). In the first situation, the Learning Entity has the role of Learner, while in the second situation the same Learning Entity has the role of Teacher. This implies that what role the Learning Entity takes depends from the Events and Triggers to which it is exposed.

Furthermore, the Learning Step element is introduced in order to show that "each Learning Activity is composed of one or more Learning Steps", but "each Learning Step can be part of one and only one Learning Activity". As the Learning Activity is composed of Learning Steps, the same relation between the Learning Role and the Learning Activity is applied between the

Learning Role and the Learning Step. In this way the flexibility is introduced and the Learning Entity in the same Learning Activity may have different Learning Roles for different Learning Steps.

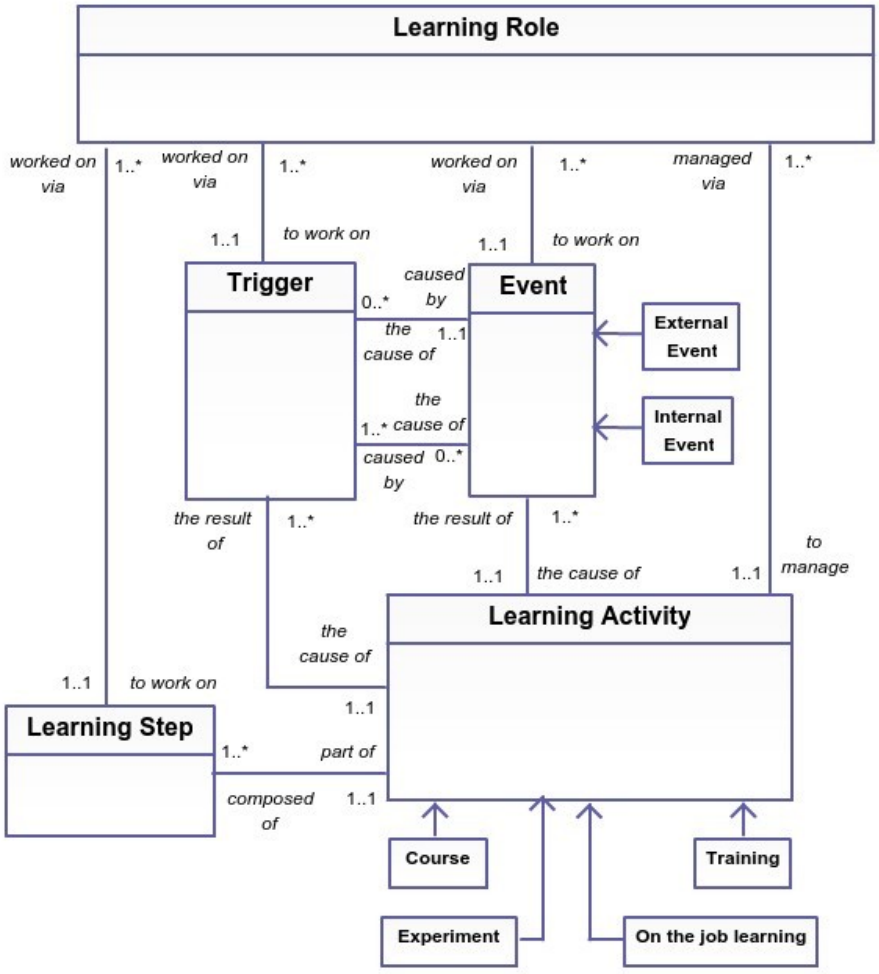

Figure 11: Learning Activity element

Although the Person learns, in the Learning organization the Person needs to practice more radical learning [Argyris, 1999; Garratt, 1987; Senge, 1990; Thomas and Allen, 2006]. However, in order to be able to practice radical learning, adaptive learning must also be practised [Senge, 1990]. Actually, any subsequent level of learning transcends, but it includes the previous level.

To represent the levels of learning, the Learning Level and Learning Level Type elements are introduced (Figure 12). The Learning Level Type provides the flexibility for increasing or

reducing the Learning Levels. For example: it might be that some organizations are interested in only two levels (single-loop and double-loop learning). Furthermore, to enable the transcend and embed characteristics of the levels, the relations "each Learning Level is embedded in none or one Learning Level" and "each Learning Level embeds none or one Learning Level" are introduced. The instantiation will be that Person (Learning Entity), to practice double-loop learning (Learning Level) needs to master the single-loop learning level (Learning Level). The relations between the Learning Level and Learning Activities are described as "each Learning Activity is positioned at one and only one Learning Level" and "each Learning Level is represented in none or more Learning Activities". However, it is not only the Learning Activities that can be positioned at certain Learning Level, but also the Learning Entities can be positioned at certain level represented by the relation "each Learning Entity can be positioned at one and only one Learning Level".

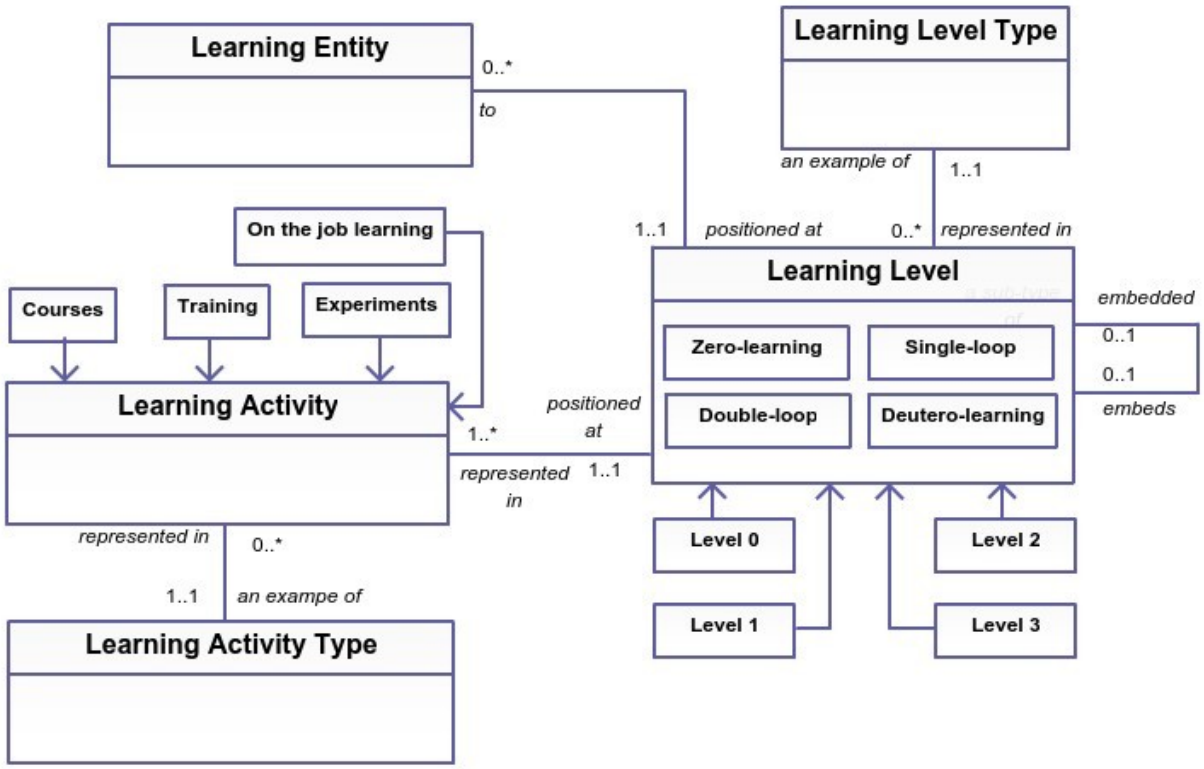

Figure 12: Learning Levels element

EXAMPLE: Maintenance employee (Person) is positioned at Level 1 - single-loop learning (Learning Level) while Experiments (Learning Activity) are positioned at Level 2 double - loop learning (Learning Level).

Direction pillar

The direction pillar guides the learning organization and shows where the organization wants to be in the future. It can justify the alignment and the changes needed. The direction pillar contains the facets vision and strategy.

The vision shows where the organization wants to be in the future i.e., what the organization wants to become. Strategy is creation of a unique and valuable position, through creating fit among and, integrating company's activities and by making trade-offs in competing [Porter, 1996]. What differentiates the vision of the Learning organization is that it is challenging, fosters risk taking and experimentation [Senge, 1990]. Also, the learning organization's vision needs to be shared by the employees of the organization [Marquardt and Reynolds, 1994], they need to understand and support it. This could be achieved through interactions of the personal visions that the individuals in the organization have [Senge, 1990]. The teams are the core structure through which these interactions occur [Watkins and Marsick, 1993]. The leaders play an important role in developing and sharing the vision. When the vision is confirmed, the strategy should draft the programmes and plans through which the vision will be achieved, and determine the resources needed for that. Based on the notion that the learning organization is continuously changing and transforming [Garvin, 1993; Pedler et al., 1991], and the need for strong employee involvement, the strategy development process should not be only planned but also relatively unstructured, emergent [Slater and Narver, 1995; Thomas and Allen, 2006] and decentralized [Slater and Narver, 1995].

The elements Vision and Strategy are introduced (Figure 13). The relation between the Learning Entity and Vision is defined as “each Learning Entity has none or more Visions”. The constraint is that Person can have a Personal vision, Team can have Intermediate vision and Organization can have a Shared vision. Furthermore, the relations “each vision may be proposed by one or more Learning Entities” and “each Vision is developed through one or more communication activity” ensure the participation of all the members of the organization in the development of the Vision. The same relations between Communication activity and Strategy ensure that the strategy is also shared. “Each Communication Activity is an example of one Communication Activity Type” such as meetings, emails, conference or kitchen talk. In this way, it is identified that the Vision and Strategy can be communicated through different Communication activities. By relating the Vision and Strategy with the Learning Activity, the options for flexibility and emergence in their development, is enabled. On the other hand, through the relations “each leader may enable one or more Visions (Strategies)” and “each Vision (Strategy) may be enabled by one or more Leaders”, the important role of the leaders in development of vision and strategy is acknowledged.

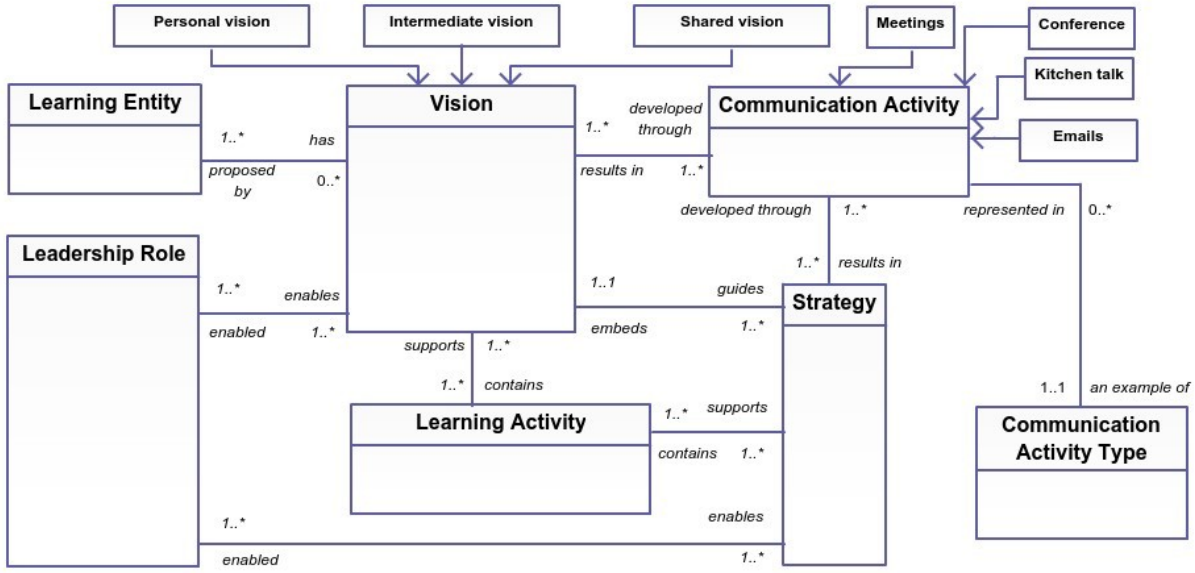

Figure 13: Vision and Strategy element

EXAMPLE: Employee John Day has his personal vision and at a team meeting he presented his vision and started the discussion with the other colleagues. This discussion has resulted in intermediary vision that will be discussed again on other meetings.

Infrastructure pillar

The infrastructure pillar contains facets that support and constrain learning in the organizations. They represent the visible aspects of the organization. The identified facets are: structure, technology and processes.

Structure

Structure represents the formal way of identifying who is taking responsibility for what; who is exercising authority over whom; and who is answerable to whom [Stacey, 2003]. The learning organization structure is usually described as organic, networked, decentralized, flat, team-based, informal, delayered [Goh, 1998; James, 2003; Lundberg, 1995; Nonaka, 1991; Örtenblad, 2004; Slater and Narver, 1995; Swieringa and Wierdsma, 1992]. There is a strong consensus in the LO literature that the structure of the LO should not be hierarchical. However, the approach that the structure should completely eliminate hierarchy should, also, not be followed. The organizations have aspects that need to be clearly structured, for example lower level operational aspects, but also aspects that need to be flexible in order to be innovative. To meet this challenge the learning

organization should have “requisite variety” of structures: hierarchy to provide the stability and the flat structures to provide the flexibility when needed [Hitt, 1996; Nonaka, 1994].

The relations between the Learning Entities are defined through the Learning Entity Relationship element (Figure 14). This element enables the representation of any relationship between two learning entities. In line with the requirements for “requisite variety” of structures, the business rule of the structure is transcends and embeds, so to have a flexible structure, we also need to have a hierarchical structure.

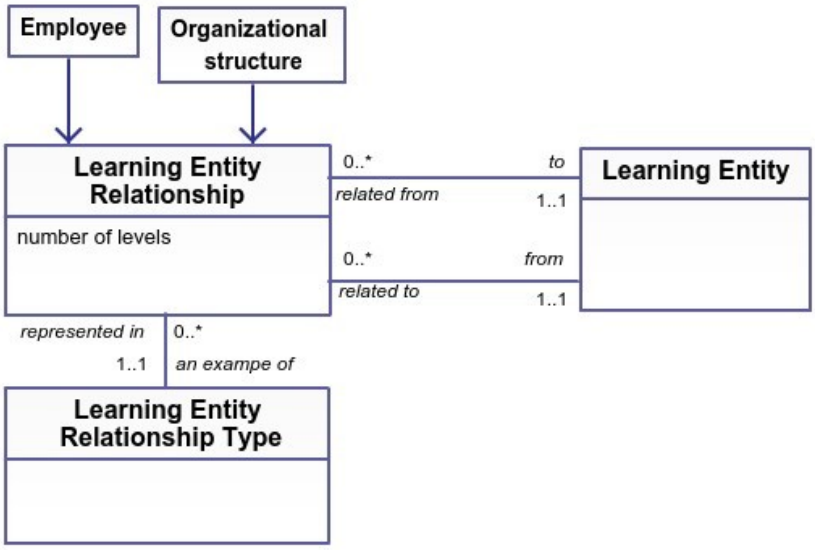

Figure 14: Learning Entity Relationship element

EXAMPLE: Through Learning Entity Relationship from Individual “John Jones” to Organization “Ajax” we have an example of a Learning Entity Relationship “Employee”.

Technology

Technology includes all the artefacts the organization uses to support the activities in the organization. The successful Learning organizations elicit, code, store, and distribute information and knowledge. To achieve this “each Learning Entity is a player of one or more Information Management Roles” (Figure 15). The roles can be Writing, Telling, Storing etc. Through these roles “each Learning Entity may use none or more Information Assets”. In the learning organization two types of assets are identified: physical and abstract. Physical assets are a tangible physical thing and abstract asset is a thought, an idea that does not have physical

evidence. However, Goh [1998] argues that skill and knowledge acquisition are useless unless they can be transferred to the immediate job by the employee, or transferred to other parts of the organization to solve problems and energize creative ideas. The information-communication technology has a central role in supporting these processes. To achieve this, special relations between the Learning Entity and the Information Assets are established. Those relations are "each Learning Entity may be delegated to none or more Information Assets" and "each Information Asset may be assigned to one or more Learning Entity". The Information Assets work with Information Resources that are result (and input) of the Activities in which the Learning Entity participates. Each Information Resource may be Physical or Electronic copy, and may be managed by one or more Information Management Roles. However, it is important to remember that technology is an adjunct to faster learning, not the driving force behind it [Guns, 1998].

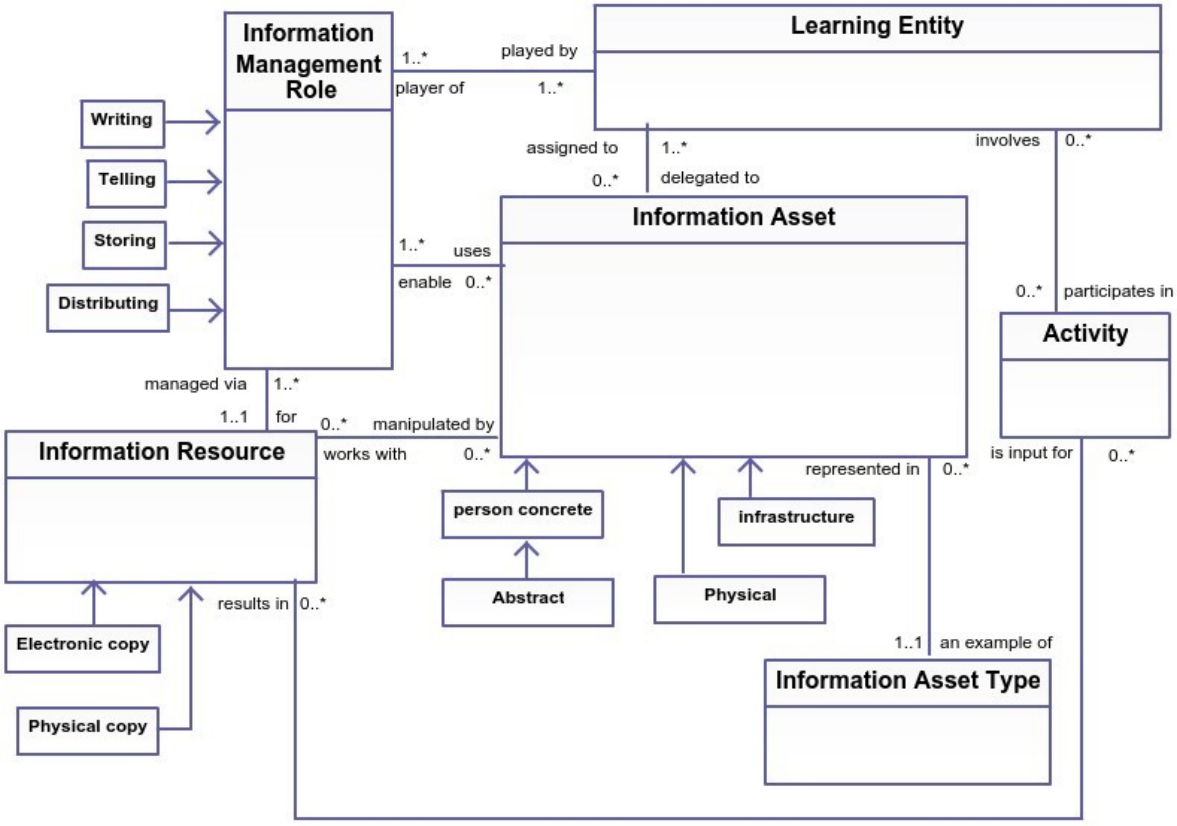

Figure 15: Information Asset element

Based on the previous description, we identified that "each Learning Entity is a player of one or more Information Management Roles through which s/he may use none or more Information

Assets". Also "each Learning Entity may be delegated to an Information Asset that s/he may use to enable one or more of its Information Management Role". The relation between the Information Asset and the Information Resource is defined as "each Information Resource may be manipulated by none or more Information Asset". Additionally, "each Information Resource is an input for none or more Activities", but also "each Activity may result in none or more Information Resources". The Information Resource is managed through the Information Management Role, through the relationship, "each Information Management Role may be for one and only one Information Resource" and "each Information Resource may be managed via one or more Information Management Roles".

EXAMPLE: John Day in his office was making a presentation (Electronic copy of Information Resource Instance) for the new product he was working on (Writing Role). He gave the presentation on a department meeting (Telling Role). The colleagues asked him to upload the presentation (Storing role) on the corporate Intranet (Infrastructure asset) . He used his computer to do that (Person concrete asset) and informed the colleagues that the presentation is uploaded at the Intranet (Distributing role).

Processes

Process is an intended structured or unintended emerging set of activities aiming to produce a specific output [Davenport, 1993]. The definition is based on the work of Davenport [1993] and Weick [1979] and shows the importance of the structured and emerging processes for the learning organization. The processes are the place where "the rubber meets the road". The processes are important because re-framing an organization's approach to its environment must be followed by an internal re-framing of processes and managerial practices that put these ideas into action [McGill et al., 1992]. A noticeabe feature in the learning organization literature is that - it is more discussed about the conditions and outputs than about the processes [Huysman, 1999]. In our patterns we have identified three core activities: Learning, Communication and Leadership (Figure 16). The relationship is that "each Activity supports (is supported by) one or more Activity".

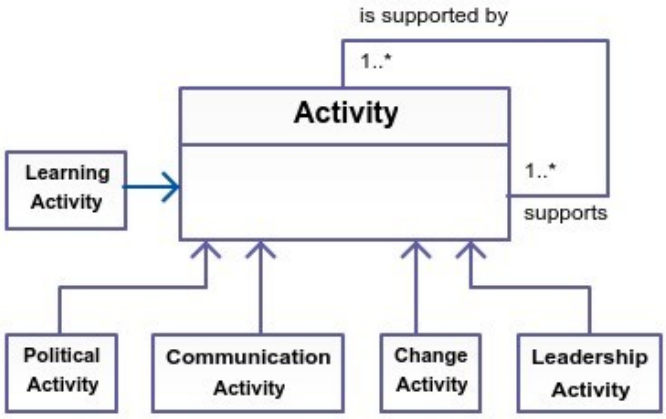

Figure 16: Activity element

EXAMPLE: Employee John Day received an email from their partner research company (Activity Communication) with information from three markets. He used this information, to calculate what could be the sales in the next period and how this could influence their strategy (Activity Learning)

Informal

The informal pillar contains the non-visible aspects of the organization that influence how the individuals and the organizations see and approach reality. It contains the following facets: culture, power and politics.

Culture

Culture is a pattern of assumptions, values and norms that are more or less shared by organization's members [Cummings and Worley, 2005]. In the learning organization the culture should support and encourage learning in the organization [Coopey, 1995; Giesecke and McNeil, 2004; Lundberg, 1995; Luthans et al., 1995; Marquardt and Reynolds, 1994; Pedler et al., 1991; Watkins and Marsick, 1993]. The culture should have the following characteristics:

- Openness. People are able to share their ideas, speak without being afraid. They will have trust between each other and speak their minds;
- Experimentation. Seeking for new things by taking risks in order to create competitive advantage for the organization;
- Participation. All the employees should be able to participate and work together in order to achieve the goals. All the employees are treated equally, and the vertical and horizontal

barriers are eliminated;

- Dialogue. Discussion is not sufficient; employees should get involved in a dialogue, should be able to ask any type of questions and get feedback on them. After the dialogues, the employees should have time for reflection on which it will build its learning.

These characteristics are contained in the Communication Activity Characteristics where "each may be used to describe one or more Communication Activity" (Figure 17). For example, the Meetings should have Dialogues and the Person should be able to be a player of a Participant's role in that Meeting.

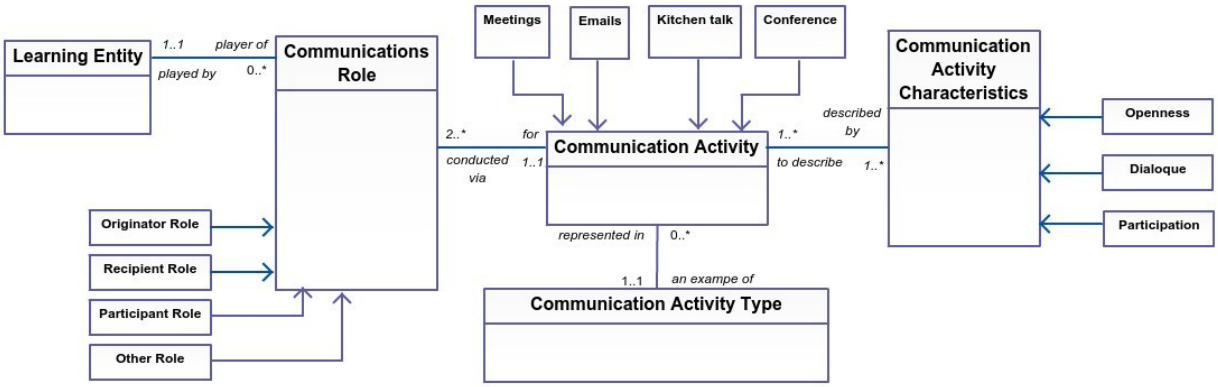

Figure 17: Communication Role and Activity element

EXAMPLE: John Day was in a meeting with his senior executives (Communication Activity Meeting) where he needed to present his idea for the new product (Communication Role Originator). However, at the meeting he was afraid to mention to the executives, the problems that the previous products had and that there is a need for a new product to eliminate this. During his presentation he only mentioned the characteristics of his product idea (lack of Communication Activity Characteristic Openness).

Power

Power is influence of one person over others, stemming from an individual characteristic, an interpersonal relationship, a position in an organization, or from membership in a societal group [Ragins and Sundstrom, 1989]. In the Learning organization the power should be shared and distributed. The employees should be empowered [Bennett and O'Brien, 1994; Marquardt and Reynolds, 1994; Örtenblad, 2004; Senge, 1990]. Where there is no decentralized power there can be no organizational learning, thus, there can be no LO [Clegg et al., 2005].

To represent this we introduce the elements Empowerment and Power (Figure 18). “Each Empowerment may be based on one or more Powers”. Also, “each Power may be distributed in order to Empower”. Through these relations the Learning Entity is Empowered based on a Power that other Learning Entity has. However, two issues should be taken into account regarding empowerment. First, to empower people in unaligned organizations can be counterproductive [Senge, 1990] and second, empowerment is specific to a situation [Watkins and Marsick, 1993]. This is confirmed through the relations “each Empowerment is based on one and only one Shared Vision” and “each Empowerment is specific to one and only one Task”. The other way around is that “each Shared Vision may result in one or more Empowerments” and “each Task may be delegated an Empowerment”.

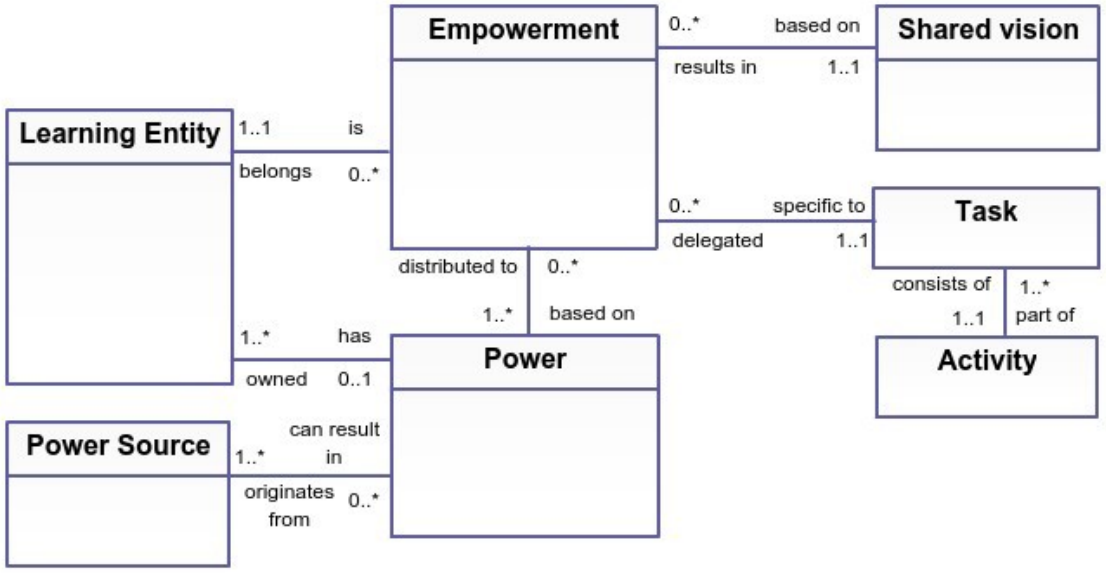

Figure 18: Empowerment and Power element

EXAMPLE: John Day (Learning Entity) was informed by his manager (Learning Entity) that because he knows his idea best (Power source), he is allowed (Empowerment) to identify suppliers (Activity) for the needed materials and that he can (Empowerment) negotiate (Task) with them on the official meetings (Activity).

Politics

Politics are the activities taken within organizations to acquire, develop, and use power and other resources to obtain one’s preferred outcomes’ [Pfeffer, 1992]. The politics facet is closely related to power facet, but the politics have been largely ignored in the LO literature, or it is implicit in

many of the ideas, theories and prescriptions for learning and the LO [Coopey, 1995]. Where mentioned, the political activity is seen as a pernicious means of resolving conflict [Coopey, 1995]. However, if legitimized through some sort of democratic framework, the political processes can widen the understanding of the processes that constitute learning in organizations [Coopey and Burgoyne, 2000]. As a result, only the relations of the Politics are presented, not customized to the Learning organization characteristics (Figure 19).

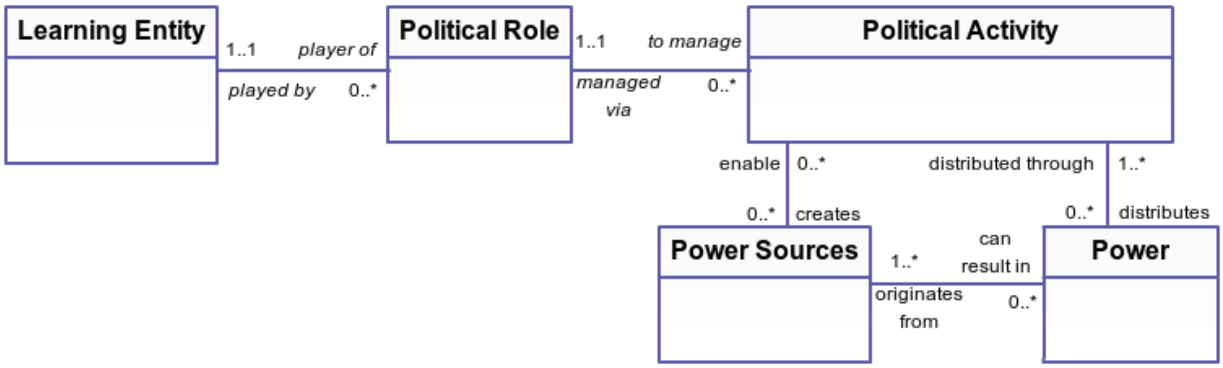

Figure 19: Political Role and Activity element

EXAMPLE: John Day (Learning Entity), because of workload, needed one more week to get ready with a specification he needed to start the discussion with the suppliers. As being most knowledgeable about the products (Power Source) and being responsible for the project (Power Source) he informed the management that there were some additional aspects that needed to be added to the specification in order to be completed and he extended the deadline for one week (Political Activity).

Change pillar

The facets of the change pillar enable the changes in the learning organization by influencing all other facets in the Learning Organization Patterns. It contains the leadership and change facets.

Leadership

Leadership is the process of providing direction and influencing individuals or groups to achieve goals. According to McGill et al. [1992], "the role of leadership in unlearning and learning cannot be overstated". Without a leader who wants to create a LO, the possibility an organization to become a LO is very small [Senge, 1990; Wick and Leon, 1995]. The leader has influence on all the aspects of the learning organization from vision, structure, culture and the other facets. However, the leadership should not be reserved and concentrated in the top positions but have

"ecology of leadership" [Senge, 1990] consisting of leaders that can be found at any level and position in the organization [Goh, 1998; James, 2003; Marks and Louis, 1999; Nonaka, 1991; Senge, 1990]. The relation "each Position, held by one or more Persons, may take a Leader Role" (Figure 20).

To respond to the challenges of the complex environment the Learning Entity needs to play different roles [Slater and Narver, 1995]. According to Senge [1990], the leader should play four roles: servant, teacher, coach and designer.

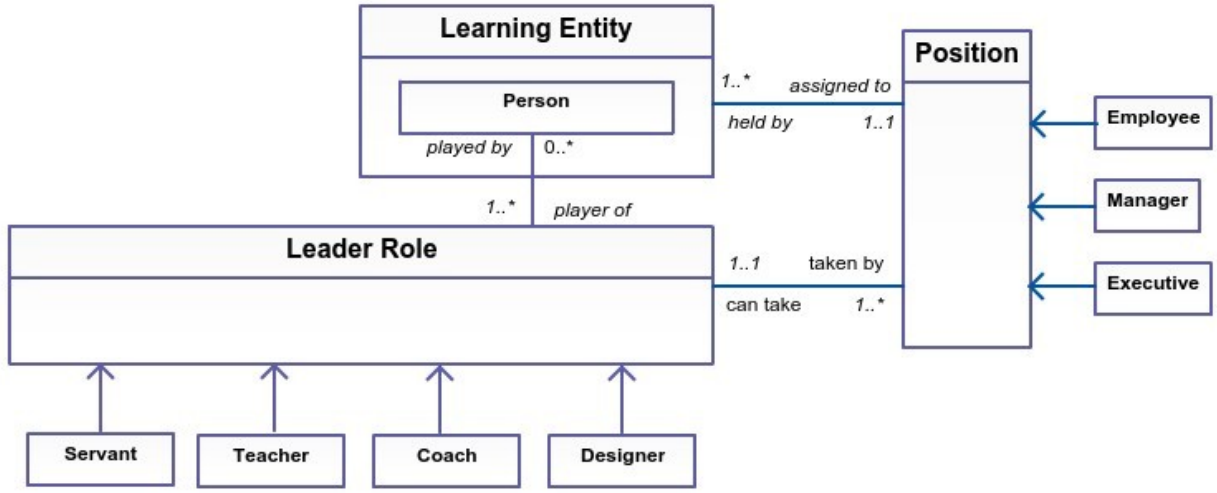

Figure 20: Leader Role element

EXAMPLE: John Day (Learning Entity), an employee in the company (Position) at the meeting stood up and said that they need to become a learning organization in order to overcome the current problems (Leader Role Designer).

Change

Change is an act or process within the organization through which something becomes different. This broad definition tries to encompass the plurality of definitions and understanding of what change is [Weick and Quinn, 1999]. LOs are supposed to allow not only for continuous improvement, but also major change and transformation. The organizations need to change to become LO, and continually make changes to stay LO. In the beginning, through a longer period, the organization needs to transform itself in order to become a LO. Later, when the organization becomes a LO, it needs to do transformational and adoption change on a broader scope in a shorter period of time. At the end, it should be mentioned that it is critical for the organization to have an ability to reach the desired state in the time frame imposed by the realities of the

competitive environment [Dervitsiotis, 1998] (Figure 21).

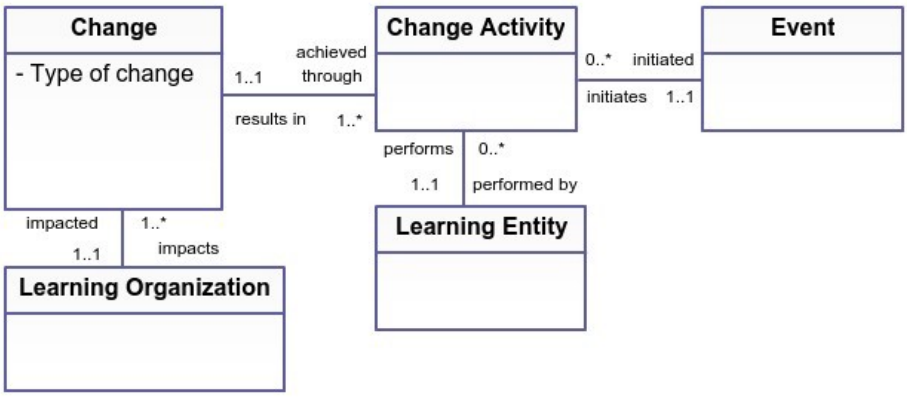

Figure 21: Change Activity element

EXAMPLE: John Day (Learning Entity) is proposing (Event) a new improved process (Change Activity) that could result in an incremental type of change for the organization (Change).

4.5 Learning Organization Generative Mechanism

The previous section presented learning organization patterns which are based on literature review and are rather descriptive. However, based on the patterns, a learning organization generative mechanism can be identified. The LO generative mechanism consists of (Figure 22) [Santa and Nurcan, 2014c]:

- the learning levels element and
- "transcends and embeds" axiom.

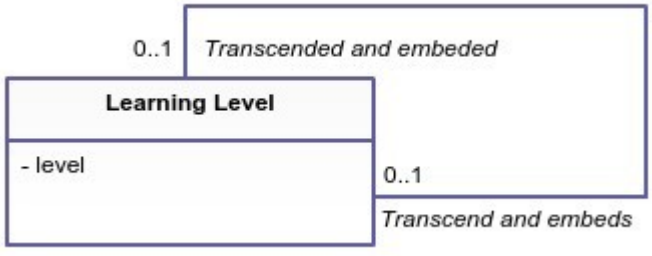

Figure 22: Learning organization generative mechanism

The patterns have indicated that the Learning Entities and the Learning Activities are positioned

at certain Learning Levels. These levels determine what the Learning Activity can achieve and what the Learning Entity is capable of. The position the Learning Entity has on the Learning Levels constraints the Learning Role that the Learning Entity plays to manage the Learning Activity. So, for example: Joe, a Person (Learning Entity), is positioned at Single-loop learning (Learning Level), this means that although he can be a player of the role Learner he is constrained to play this role only to Learning Activities that are positioned at Single-loop learning level. However, it is important to note that, in a learning organization this positioning of the Learning Entity at a certain Learning Level does not influence only the Learning Roles and Learning Activities, but also all other concepts and relations that the Learning Entity has with them. For example, in the technology facet the position of the Learning Entity on the Learning Level influences what technology will be assigned to the Learning Entity. For example, Joe will be assigned a technology that will support his efficiency driven learning. This constraint relation that Learning Level implies on the Learning Entity and Learning activity must be recognized in the frameworks, tools and systems that are developed for the learning organization. The influence is the same on the visible formal and invisible tacit aspects of the elements.

The axiom that defines and constraints the relations between the Learning levels is "transcends and embeds". The result is a developmental order of the levels. In this way, the learning level Double-loop learning has its own characteristics that transcend the characteristics of the Single loop learning, but also include them. The implication of this axiom is that we are certain that a Learning Entity that is positioned at Double-loop learning is also capable of Single loop learning.

4.6 Descriptive Lightweight Learning Organization Ontology

Based on the learning organization modeling patterns, the descriptive lightweight learning organization ontology is developed. The descriptive lightweight learning organization ontology contains classes and relations between these classes. They are presented in terms of definitions. Definitions form the ontology's backbone, defining its conceptual structure. The following convention is applied: The name starts with D and then, letter C for classes or R for relations is added, followed by a number. The definitions are numbered as they appear. In the definitions, the relations are displayed in bold face and not capitalized ("**embeds_in**"). The classes are capitalized and italicized ("*Entity*"). After the definitions, examples are presented.

We begin our ontology by taking the **part_of** relation as a primitive relation and use it to define the **embeds_in** relation.

DR1: *Entity X* **embeds_in** *Entity Z* if *Entity X* is **part_of** *Entity Z.*

DC1: *Entity* is a particular autonomous unit.

In the learning organization, three main entities are identified: individual, team, and organization [Giesecke and McNeil, 2004]. They are subclasses of the class *Learning Entity*.

DC1-1: *Individual* is a human being.

DC1-2: *Team* is a form of collection of individuals who work on a common issue.

DC1-3: *Organization* is an organized form of individuals with a particular purpose.

Other entities in the learning organization can also be identified such as dyads, departments, and strategic business units. The learning organization should also be aware of its external environment [Watkins and Marsick, 1993]. Thus, the environment is also a *Learning Entity*.

DR2: *Entity Z* **embeds_in_sum** if *Entity X* **embeds_in** *Entity Z* and *Entity Z* **embeds_in** *Entity Y* then *Entity Z* **embeds_in** *Entity Y*.

Through the **embeds_in_sum**, the *Level* is introduced.

DC2: *Level* is a position on an artificially determined hierarchy.

The *Level* for *Learning Entity* is named *Ecological* and the *Level for Learning* is named *Developmental*.

DC2-1: *Ecological Level* is a position on an artificially determined hierarchy of entities.

For *Entity*, the *Ecological Levels* are individual, team, organization, direct environment (competitors, suppliers, governmental institutions), and general environment (culture, politics, social aspects).

DC2-2: *Developmental Level* is a position on an artificially determined hierarchy of states.

Based on the work of Bateson [1979] and Argyris [1999], four levels of learning are identified: no learning, single-loop, double-loop, and deutero-learning. Senge [1990], on the other hand, identifies two levels of learning: adaptive and generative. For *Learning*, the *Developmental Levels* are no learning, single-loop and double-loop.

DC3: *State* is a particular condition in which someone or something is at a specific time. The *State* can be *Actual* or *Potential*.

DC3-1: *Actual State* is a state that exists at the moment.

DC3-2: *Potential State* is a state that could exist in the future.

For example, in a learning organization, the individuals and teams should be empowered [Senge, 1990], that is, to be in an empowered state. In addition, the structure should be organic, that is, to be in an organic state [Evans, 1998].

The *Level* of the *Entity* is determined by the relation **positioned_at**.

DR3-1: *Entity X* is **positioned_at** *Ecological level X,* if *Entity X* has the characteristics determined for *Ecological level X*.

DR3-2: *Entity X* is **positioned_at** *Developmental level X,* if *Entity X* has the characteristics determined for *Developmental level X*.

DR4-1: *Entity Z* **transcends_and_includes** *Entity X,* if *Entity X* **embeds_in** *Entity Z*; and if *Entity Z* is **positioned_at** the next level of defined ecological hierarchy; and if *Entity Z* has the characteristics of *Entity X* and it also has its own characteristics.

This means that each individual brings its own characteristics into the organization; however, the organization adds its own characteristics. This requires having a multilevel integral look on the entities.

DR4-2: *Level Z* **transcends_and_includes** *Level X* if *Level X* **embeds_in** *Level Z*; and if *Level Z* is **positioned_at** the next level of defined developmental hierarchy; and if *Level Z* has the characteristics of *Level X* and it also has its own characteristics.

This means that in order to practice double-loop learning, one also needs to practice single-loop learning.

DR5-1: *Entity Z* **transcends_and_includes_sum** *Entity X* and *Entity Y* if *Entity Y* **transcends_and_includes** *Entity X* and *Entity Z* **transcends_and_includes** *Entity Y.*

DR5-2: *Level Z* **transcends_and_includes_sum** *Level X* and *Level Y* if *Level Y* **transcends_and_includes** *Level X* and *Level Z* **transcends_and_includes** *Level Y*.

From this relation, we deduce that each entity or level on subsequent level is more complex.

DR6: *Entity X* is **aligned_to** *Entity Y,* if *Entity X* is **positioned_at** *Developmental level* as *Entity Y*

and if both, *Entity X* and *Entity Y* are **positioned_at** the same developmental hierarchy.

DR7: *Entity X* can be a **player_of** multiple *Roles* at the same time. *Entity X* can be a **player_of** *Role X* if it is **positioned_at** *Developmental level X* or higher, and if it has a group of *Assets X* **positioned_at** *Developmental level X* or higher.

DC4: *Role* is the way an entity participates in an activity [Uschold et al., 1998]. The entity can take different roles like learning role, teacher role, leadership role, follower role, power role, information management role, etc.

DC5: *Asset* is a resource that can create value. Two subclasses of assets are identified.

DC5-1: *Physical Asset* is a tangible physical thing. The computers, buildings, cars that the entities have are examples of physical assets.

DC5-2: *Abstract Asset* is a thought, an idea that does not have physical existence. In the ontology, through the abstract assets the existence of individual mental ideas, concepts, and models; and the existence of mental ideas, concepts, and models that are the results of interactions between individuals are acknowledged.

DR8: *Entity X* **manages_an** *Activity X* by being a **player_of** a *Role X*. *Entity X* should **manage_an** *Activity X* by being a **player_of** a *Role X* if *Activity X* is **positioned_at** the same or lower *Developmental level* of *Role X* and *Entity X*, and where *Role X* is **positioned_at** the same or lower *Developmental level* from *Entity X*.

DC6: *Activity* is a state of being active. An activity can be *Formal (visible) activity* and *Tacit activity*.

DC6-1: *Formal (Visible) Activity* is anything that involves actual doing, in particular, including action [Uschold et al., 1998]. On the other hand, the

DC6-2: *Tacit Activity* is anything that involves mental doing which actually, or potentially precedes or follows the formal activity.

This division on formal and tacit activities is important because it acknowledges the presence of mental activities that are not always clear and visible, but do exist. They are the base for the tacit knowledge [Nonaka, 1994].

DR9: An Activity **can_result_in** a *State* **positioned_at** the same lower or higher *Developmental*

level. *Activity X* **can_result_in** the same *State X* if *Activity X* and *State X* are **positioned_at** the same *Developmental level X*. *Activity X* **can_result**_in a higher *State Y* if *Activity X* is **positioned_at** *Developmental level Y*. *Activity X* **can_result_in** a lower *State W* if *Activity X* is **positioned_at** *Developmental level W*.

DR10: Each *Activity* is **triggered_by** an *Event*. An *Activity* is **triggered_by** an *Event* if the *Activity's* start is related to the *Event*.

DC7: *Event* is an actual or potential occurrence.

DC7-1: *Internal Event* is an event occurring within an *Entity*.

DC7-2: *External Event* is an event occurring outside the *Entity*.

For example, an external event can be the introduction of a new product by the competition.

4.7 Conclusion

In this chapter, through the identification of the learning organization patterns, a descriptive lightweight learning organization ontology is proposed. The ontology includes classes and relations through which the concept of the learning organization can be clarified. For each class and relation, a definition is given.

Although the ontology is descriptive lightweight, it fulfils the following [Santa and Nurcan, 2014b]:

- It provides the basic concepts through which a learning organization framework can be developed;
- It identifies the *Learning Entity* and the *Learning Level* as central classes because they are related to all the other classes. In addition, the values that these classes have influence the starting positions for the development of the learning organization;
- It identifies the relations **embeds_in** and **transcends_and_includes** as important relations through which the learning organization is unique as a concept. These relations ensure that the systemic approach is present in the development of the learning organization;
- It helps stakeholders involved in the development of a learning organization, to be aware of how the different classes of an organization are aligned through the relation **aligned_to**.

Mijalce Santa

Chapter 5

The Learning Organization Atlas Framework

Turkish: I fail to recognize the correlation between losing ten grand, hospitalizing Gorgeous, and a good deal.

Movie “Snatch” [Ritchie, 2001]

5.1 Objective

As stated in Chapter 1, despite the extensive debate about the value of a learning organization in order to be competitive and the presentation of its positive sides, the learning organization has also raised a lot of criticism and dilemmas. Two major issues on which the critics are focused are: which methods and models can be used to facilitate the process in becoming a learning organization and how to measure the learning organization.

The objective of this chapter is to present an attempt to respond to these critics by introducing a multilevel and multifaceted framework for a dynamic development of the LO.

To achieve this objective, first the related work is presented and discussed. Then, a requirements analysis is performed and the specific requirements are presented. Based on that, the map analogy is presented. At the end, the learning organization atlas framework concept is elaborated.

5.2 Related work

According to DiBella and Nevis [1998], there are three perspectives to the learning organization:

- Normative perspective, in which it is argued that, learning can occur under certain conditions. The leaders and the organization need to create those conditions through a disciplined action or intervention;
- Developmental perspective, according to which the learning organization is a stage in the organization's development. There are different styles and processes for different stages;
- Capability perspective points out that each organization learns through its own learning processes embedded in the organization's culture and structure.

The most known models in the learning organization literature are the energy flow model [Pedler et al., 1991], Senge's model [Senge, 1990], seven dimensions of the learning organization [Watkins and Marsick, 1993], and learning organization building blocks [Garvin et al., 2008]. All these models are normative and suggest that learning can occur only under certain conditions. The leaders and the organization need to create those conditions through disciplined action or intervention. If the organization does not meet these conditions, it cannot learn.

Pedler et al. [1991] focus their model on movement and identify flows that can move: a) vertically from an individual to the collective and, vice versa linking ideas and policy and b) horizontally from vision to action and, vice versa linking actions and operations. These flows are

supported by eleven characteristics that create the learning organization:

- The learning approach to strategy;
- Participative policy making;
- Informating;
- Formative accounting and control;
- Internal exchange;
- Reward flexibility;
- Enabling structures;
- Boundary workers as environment scanners;
- Inter-company learning;
- Learning climate;
- Self-development opportunities for all.

Although this model tries to have an integrated approach toward the learning organization, it cannot be used for its development. The main shortcoming of this model is that it neither defines the relations between the elements nor on how the interactions between the flows should be done.

Senge [1990] identified five elements that are important for the learning organization: building a shared vision, personal mastery, working with mental models, team learning, and systems thinking. He does not structure the elements in a model, and does not provide a clear picture on the relations between these elements. A characteristic of this model is that it introduces systemic thinking to the learning organization and identifies it as an element that underlies all the other elements.

Through the seven dimensions of the learning organization model, Watkins and Marsick [1993] view it as one that has the capacity to integrate people and structures in order to move toward continuous learning and change [Yang et al., 2004]. The model is structured around four levels: individual, teams, organization, and society. For each level, they identified seven distinct but interrelated dimensions of a learning organization:

- Continuous learning;
- Inquiry and dialogue;
- Team learning;
- Empowerment;
- Embedded systems;

- Systems connection; and
- Strategic leadership.

This model is clearly organized and structured. However, two shortcomings are identified. First, a lack of the developmental aspect that presents the levels that these dimensions can have, and second, a lack of clear identification of the organizational and team dimensions impacts on the individual dimensions.

The learning organization building blocks model has identified three blocks that support the development of the learning organization [Garvin et al., 2008]:

- a supportive learning environment that consists of psychological safety, appreciation of differences and openness to new ideas, and time for reflection;
- concrete learning processes and practices consisting of experimentation, information collection, analysis, education and training, and information transfer; and
- leadership that reinforces learning.

This model does not identify the levels in the learning organization and, lacks identification of the influence of all the blocks on the individual who is learning in the organization.

In Table 12, a comparative overview of the models is presented (1 is low, 5 is high). The comparison is based on the number of facets that are included in the models, levels of development of the facets, identification of the relations between the facets and the possibility to use the model for LO development. Overall, the table presents that the existing models provide rather poor base for mapping and developing the learning organization [Santa and Nurcan, 2013].

Authors	Number of facets	Number of levels	Number of relations	Applicable for development
Pedler et al., (1991)	4	1	1	1
Senge, (1990)	3	2	3	2
Watkins and Marsick, (1993)	3	4	3	2
Garvin et al., (2008)	3	2	3	2

Table 12: Evaluation of the models.

However, although each perspective has different set of implications, each one contributes to our understanding of the learning organization [DiBella, 1995]. Thus, following only one perspective endangers the realization of the learning organization concept. This proposition provides a foundation for a fourth, integral perspective of the learning organization (Figure 23).

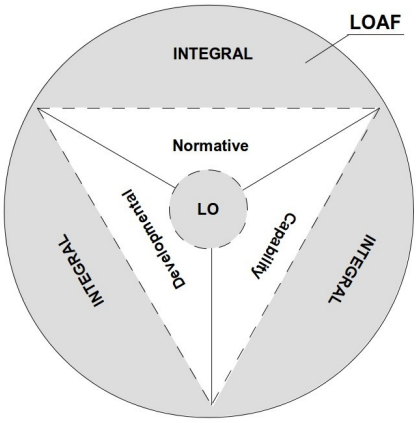

Figure 23. Integral perspective of the learning organization

The integral perspective acknowledges the complementarity of the previous three perspectives by having a pluralistic view of the learning organization. According to the integral perspective, organizations should, at the same time, prepare for the future (normative), learn from the past (developmental) and build on their uniqueness (capability) in order to become learning organizations.

Based on the integral perspective, Santa and Nurcan [2013] have introduced the Learning Organization Atlas Framework, a multilevel and multifaceted framework for a dynamic development of the learning organization.

5.3 Requirements analysis

As presented in the State of the art and Learning organization ontology chapters the learning organization concept is a complex socio-technical system. This imposes number of requirements that need to be fulfilled by the learning organization atlas framework. This section identifies and discusses specific requirements for the design and the evaluation of the framework. The requirements are derived from the in-depth analysis of the learning organization literature.

Large number of facets and attributes. The learning organization is constructed from a large number of facets, attributes and variables [Yang et al., 2004]. This is confirmed in State of art

chapter, where by in-depth literature analysis 21 facets, 49 attributes and more than 150 values were identified. By including as much as needed facets and attributes in the framework a better picture of the learning organization can be painted.

Requirement 1: *A framework for multivariate continuous transformation to learning organization must allow inclusion of large number of facets, attributes and values.*

Complex relationships. The relationships within and between the facets are complex [Grieves, 2008]. It is also hard to identify their causality. However, through the analysis of the relations in the Learning organization ontology chapter the relations **embeds_in**, **transcend_and_include** and **align_to** were identified as important. These relations ensure that the systemic approach is present in the development of the learning organization.

Requirement 2: *A framework for multivariate continuous transformation to learning organization must represent the relations* **embeds_in**, **transcend_and_include** and **align_to**.

Multilevel. The "learning levels" is a learning organization generative mechanism. It impacts each element and facet of the learning organization. It is the base on which the relations **embeds_in**, **transcend_and_include** and **align_to** can be applied. Thus, the learning organization is a multi-level construct and this should be represented in the approaches for development learning organizations.

Requirement 3: *A framework for multivariate continuous transformation to learning organization must allow multilevel representation of the learning organization facets.*

Context aware. Each organization is different and each needs to find its own path in becoming a learning organization [DiBella, 1995; Redding, 1997]. Thus each organization learns in different context. These differences in the context should be anticipated in the models and frameworks for the development of a learning organization. By including the context, the flexibility of the model will be provided and its wider applicability enabled.

Requirement 4: *A framework for multivariate continuous transformation to learning organization must provide means to contextualize the path to becoming a learning organization in accordance to organization's characteristics.*

Adjusting the model. Learning implies change. Learning as the core element of the learning organization enables it to change. Furthermore, as identified in the literature the learning organization is not a state, it is a chameleon-like target that is continuously changing [DiBella, 1995]. It is hypocritical to say that we provide a framework for something that is changing

continuously, but our framework is fixed and it can not be changed. Thus, the framework needs to provide options that will enable it to change and take modified forms.

Requirement 5: *A framework for multivariate continuous transformation to learning organization must embed flexibility through which it can be customized.*

Tool support. As identified in chapter 1 tool support for development and measurement of the learning organization is lacking and this can undermine the opportunity for development of the learning organization. Therefore, it is critical to develop a tool that will support the organizations in becoming learning organization.

Requirement 6: *A framework for multivariate continuous transformation to learning organization must include tool for support of the development of the learning organization.*

Based on these requirements the evaluation of the proposed solution will be presented in chapter 8.

5.4 Map Analogy

A map is a visual representation of an area – a symbolic depiction highlighting relationships between elements of that space such as objects, regions, and themes [Anon 2013].

The significance of maps derives from the fact that people make them in order to tell other people about the places or space they have experienced [Harley, 2002]. The result is that the other people can use this visual representation to get acquainted and understand the object, regions or themes the map is about.

Figure 24: Roadmap of Paris from Google maps

Google makes maps and significantly helps us when we are travelling around the world. The most used one is the road map. For example, for a trip to Paris, needed information is to see how to go from the airport to the hotel and then, to Notre Dame Cathedral. The Google road map enables this. They shared their experience about roads in Paris with the traveller (Figure 24).

However, when the traveller arrives in Paris s/he sees that Paris does not have only roads; it has buildings, rivers, hills, climate, animals, people, religion, culture and all other facets that in total define what Paris is. The result is that the traveller knows Paris only when the experience in these facets is shared with him/her through maps for each of the facets. Google recognized this and now they add new types of maps like street view maps and satellite maps. They layer these maps, one on top of the other, in order to enrich the traveler's understanding of the object or area they are mapping (Figure 25).

The option to add or subtract a layer, through which the same area will be looked, is an important feature. It provides an opportunity to choose the level of understanding the traveler wants to have about the given area.

Additional characteristic of the maps is that they are structured around a grid created by using different dimensions (lenses). When the grid is applied on an individual domain, the position of the content of the domain is determined. This provides an assurance that the received information from different facets is for the same position. The geographical maps use the grid created from the combination of geographic coordinates' latitude and longitude to specify the position of a point on the Earth's surface. However, there are also additional dimensions (lenses) that can be used in order to better map the area, like elevation.

Figure 25: Satellite map of Paris from Google maps

The analogy of the map provides a direction how the learning organization modeling can be approached and, what the modeling frameworks should have [Santa and Nurcan, 2014a]. The core suggestions are:

- The framework should allow different facets of the organization to be mapped;
- The framework should allow different lenses (dimensions) to be used to look on the facets and to create a grid;
- The framework should provide an opportunity for layering (to add and subtract layers) of maps.

5.5 Learning Organization Atlas Framework

Based on the conclusion of the State of Art and the map analogy, the Learning Organization Atlas Framework concept (LOAF), as a multilevel and multifaceted framework for a dynamic development of the learning organization, is developed. The framework consists of four elements: facets, grid, atlas and roadmap (Figure 26).

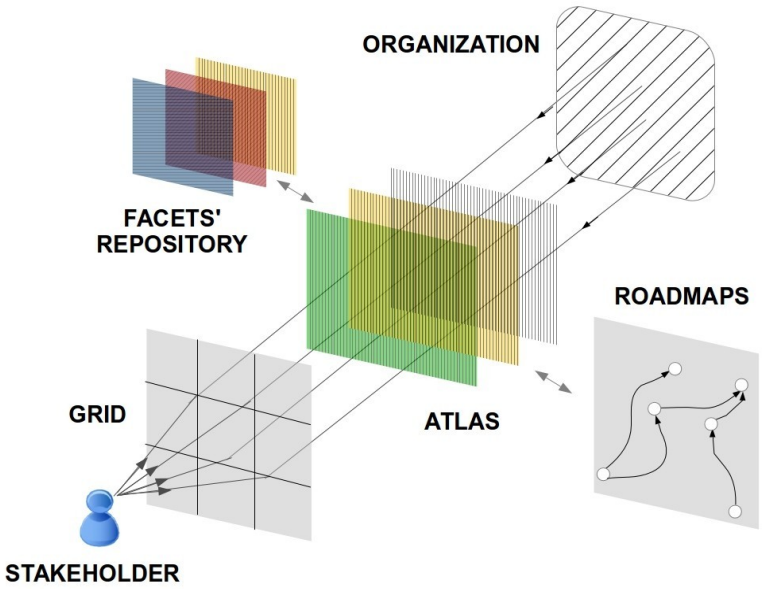

Figure 26: Learning Organization Atlas Framework concept

5.5.1 Facets

The facets are particular aspects of the learning organization. Each facet contains a set of relevant attributes through which that particular aspect is clarified. The multi facet view makes it possible to look at the learning organization in a comprehensive manner. The facets of the learning organization are based on the analysis of Chapter 3 and 4. Through the learning organization conceptual model, ten facets of the learning organization are identified: learning, vision, strategy, structure, technology, processes, culture, power, change and leadership.

The framework provides an opportunity for inclusion of facets from the tangible visible enterprise that can be seen and easily modeled, like: structure, processes, technology; and the invisible, tacit aspects of the enterprise that are hard to be seen and modeled, like: culture, power, leadership, learning etc. Thus, both parts of the organizational iceberg are included (Figure 27).

This is important because, if only the visible formal enterprise is modeled, the resulting organizational model will not be supported by the invisible tacit organization and thus not represent the real organization (Figure 28).

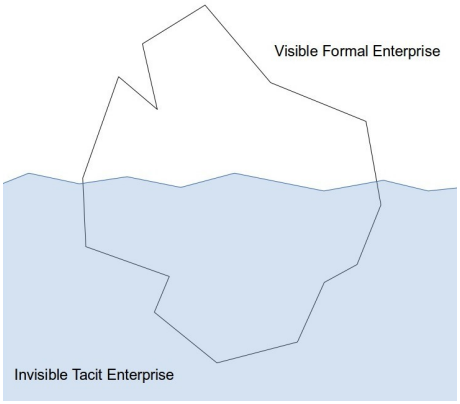

Figure 27. Organizational iceberg

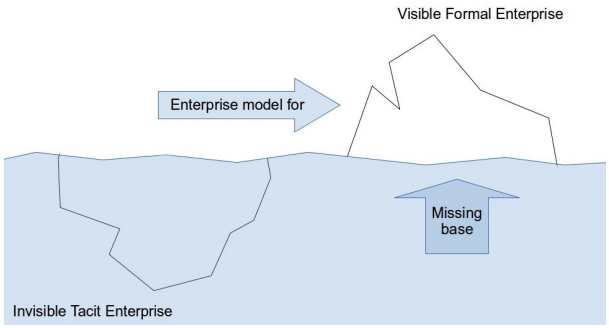

Figure 28. Modeling misalignment

To assist the modeler in the process of identification and selection of facets that will be used in the modeling, the facets' repository is introduced. The repository contains the facets that are identified through literature and practice. The modelers can add facets to the atlas, that is a repository of used facets, in order to enrich the understanding of their status on developing a learning organization, or subtract it to get shallower understanding.

This flexibility enables us to use sometimes, one facet and, at other times ten facets. The flexibility is needed because different persons have different needs and they will require only certain facets to have an understanding of the area that will meet their needs. Compared to the map analogy, only the road map is needed to go from the train station to the hotel.

5.5.2 Lenses

Merriam Webster Dictionary defines the grid as “a network of uniformly spaced horizontal and perpendicular lines (as for locating points on a map)”. The grid is a result of the combination of lenses (dimensions). When different lenses and different combinations of lenses are used, different grids are created. By applying a grid on a facet, a map of that facet is created. There are three important consequences of this approach.

- First, it is important to select lenses that can provide a better map of the facets;
- Second, at least two lenses need to be used. A better map is created when three lenses are used, but the maps are more complicated. It is not advised to use more than three lenses due to the complex maps this creates;
- Third, for each session of mapping you need to use the same lenses (thus the same grid)

for each facet you include in your learning organization model.

Based on the learning organization ontology, two lenses are identified:

- ecological – to include the entity in the model;
- developmental – to include the levels in the model.

Both of these lenses follow the relations **embeds_in** and **transcends_and_includes.**

Also based on the feedback from the first evaluation of the model, the lens of stakeholder is included as a viewpoint lens.

5.5.2.1 Ecological lens

Each organization consists of organizational (learning) entities like individuals, teams, departments, business units and, at the end, the organization itself. Based on the analysis made in the state of art chapter, the learning organization modeling patterns and the results from the pilot implementation of the framework, the following learning organization entities were identified: individuals, teams, departments, organization, direct environment and general environment. Based on the **embeds_in** relation, each of these entities is nested in another entity (Figure 29). For example, individuals are nested in teams; teams are nested in departments, etc. However, the organization is also nested in its environment (due to better graphical representation in the Figures 29 and 30 the entity department is not presented, and the entity environment is not divided into direct and general).

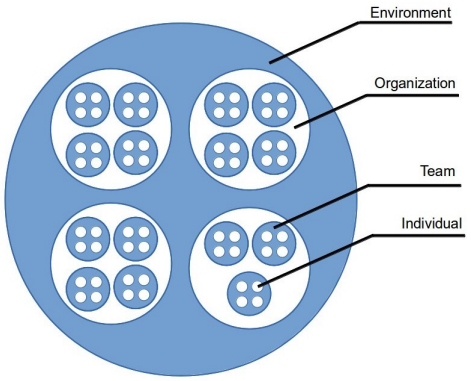

Figure 29. Ecological lens embodiment

Furthermore, the relationships between these entities are bi-directional. The individual influences the team and the team influences the individual (Figure 30).

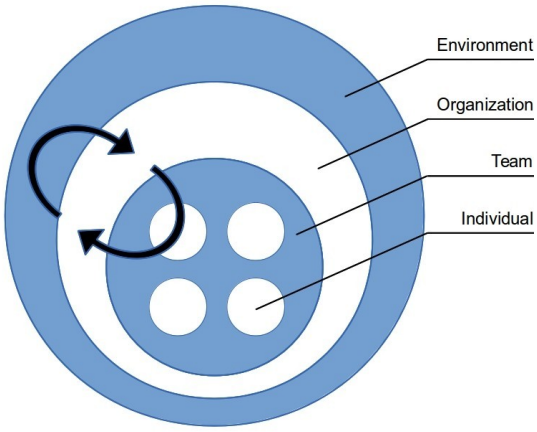

Figure 30: Ecological lens relationships

This lens allows the modeler to add or to subtract an entity to fit the framework to the modeled organization. For example, SMEs might not have departments, so departments cannot be included in the ecology. On the other hand, a large multinational company will have divisions that need to be added in the ecology. This option, to add or to subtract an entity in the ecology, presents an embedded flexibility of the framework for the creation of grids.

5.5.2.2 Developmental lens

The developmental lens shows the levels at which the entity can be found (Figure 31). The developmental levels are based on learning levels identified in the State of art chapter and learning organization modeling patterns. Based on the work of Argyris (1999) and Bateson (1979), four levels of learning have been identified:

- Zero learning – receipt of information which may lead to learning, but are not learning events;
- Learning level 1 – skill learning, that is, making choices within a simple set of alternatives. Also known as single-loop learning;
- Learning level 2 – choosing between sets within which level 1 learning takes place. Also known as double-loop learning;
- Learning level 3 – learning to learn, also known as deutero-learning.

However, only the first three levels can be found in the common business world (Argyris, 1999). Furthermore, based on the feedback from the first evaluation of the model, the deutero-learning level is omitted from the developmental lens. As a result, the developmental lens includes three

levels:

- Level 0 - No learning;
- Level 1 - Single-loop learning;
- Level 2 - Double-loop learning.

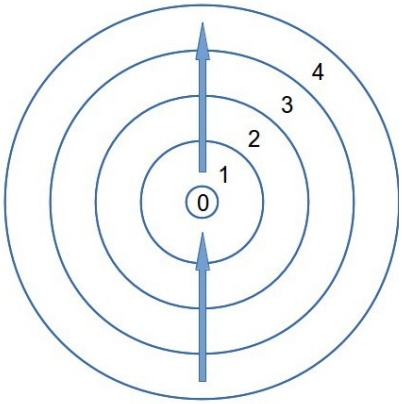

Figure 31: Developmental lens

5.5.2.3 Stakeholder lens

The stakeholder lens is a viewpoint lens. Through it, the different views that different stakeholders can have about the facets of the organization are represented (Figure 32). For example, the executive has a different viewpoint on the same facet from a production line employee. Stakeholders identified in the learning organization are employee, manager, and executive.

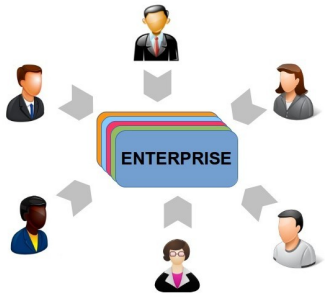

Figure 32: Stakeholder lens

5.5.3 Grid

The real power of these lenses is achieved when they are combined and, a grid is created. By combining all three lenses, a three dimensional grid is created (Figure 33). When this grid is applied to a certain facet, a map of that facet is created. Through the cells, the map shows the position of each *entity* on the *developmental levels* through the *eyes of different stakeholders*. Each cell is a state that the entity can have or strive to achieve.

The instantiation of the learning organization grid is presented in Figure 34. Due to the embedded flexibility of the framework, an entity, a level or a stakeholder can be added or subtracted without losing the logic and the understanding of the map.

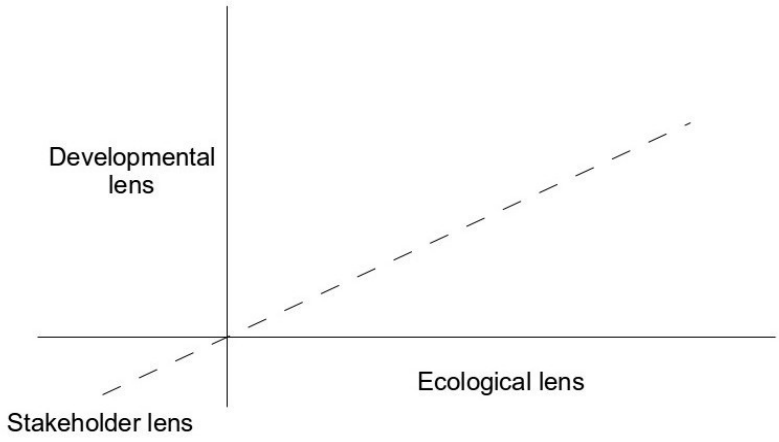

Figure 33: Modeling grid

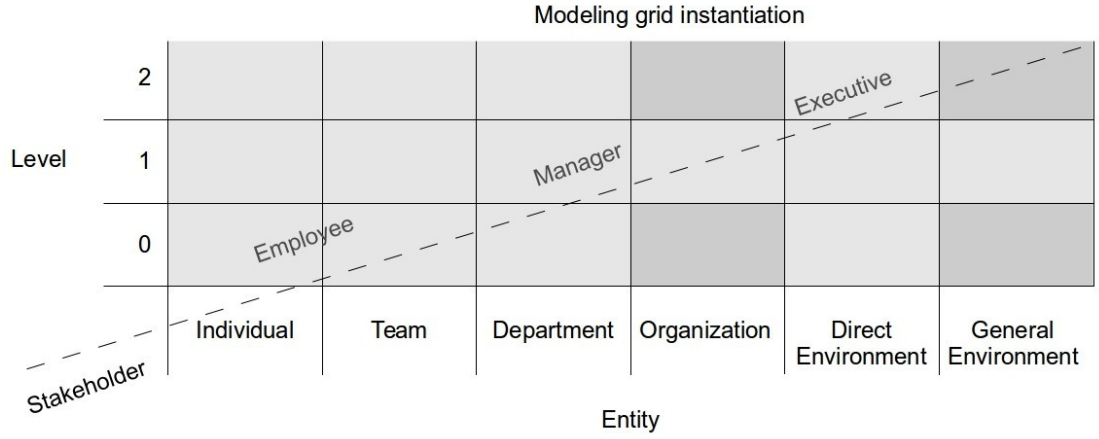

Figure 34: Modeling grid instantiation

5.5.4 Maps

The maps are created through a grid application on each individual facet. As a result, facets' maps are developed. The content of each individual map is based on the analysis made in the State of art and the Learning organization ontology chapters. Maps are divided into two parts, respectively, table and cell description.

In the table the top row contains the organizational (learning) entities and the left end column contains the learning levels. Under the entities, a role of that entity in the cells is represented. Each cell that is an intersection of the entities and levels is named. The names consist of one or two words that contain the essence of the cell's state and description. The cells description is a result of the State of art and Learning organization ontology chapter.

5.5.4.1 Learning map

		Individual learns	**Team** shares	**Department** manages	**Organization** manages	**Environment** influences	
						Direct	General
Level	0	Transactional	Meet	Waste	Waste	Null	Indifferent
	1	Adaptive	Discuss	Store	Store	One	In-box
	2	Transformative	Dialogue	Disseminate	Disseminate	Two	Out-box

Table 13: Learning map

Individual:

- Transactional: I (as individual entity) have only received information that may lead to learning, but I have not practiced learning;
- Adaptive: I (as individual entity) have practiced learning, through which the obtained information I used to correct or improve procedures, existing competences, technologies and paradigms without necessarily examining or challenging our underlying beliefs and assumptions;
- Transformative: I (as individual entity) have practiced learning that involved the modification of the organization's underlying norms, policies and objectives, that made me able to see beyond the situation and questioning operating norms.

Team

- Meet: The teams, in which I (as individual entity) participate, only meet and exchange information for mere reporting purpose with no goal to support learning;
- Discuss: In the teams, in which I (as individual entity) participate, different views are presented and defended and there is a search for the best view to support decisions that must be made at this time;
- Dialogue: In the teams, in which I (as individual entity) participate, complex issues are explored by presenting different views as a means toward discovering a new view. The assumptions the team members have are presented and examined.

Department

- Waste: In my department, the existing information and knowledge that are circulating in the department are not stored and distributed;
- Store: In my department, the existing information and knowledge that is circulating in the department is collected and stored;
- Disseminate: In my department, the collected information and knowledge is made available to teams and individuals in various ways.

Organization

- Waste: In my organization, the existing information and knowledge that are circulating in the department are not stored and distributed;
- Store: In my organization, the existing information and knowledge that is circulating in

the department is collected and stored;

- Disseminate: In my organization, the collected information and knowledge is made available to teams and individuals in various ways.

Direct environment

- Null: In my opinion the entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate in our direct environment (competitors, customers, suppliers, strategic partners, distributors) are at learning level 0;
- One: In my opinion, the entities with which I (as individual entity) cooperate in our direct environment are at learning level 1;
- Two: In my opinion, the entities with which I (as individual entity) cooperate in our direct environment are at learning level 2.

General environment

- Indifferent: In my opinion, the general environment (political forces, technological forces, economical forces, ecological forces and cultural forces), in which my organization operates, is not supportive to learning;
- In-box: In my opinion, the general environment, in which my organization operates, is supportive for adaptive learning that focuses on correcting or improving existing procedures, processes, competences and technologies;
- Out-box: In my opinion, the general environment, in which my organization operates, is supportive for transformative driven learning that focuses on questioning the existing norms and that encourages to see beyond the existing situation.

5.5.4.2 Vision map

	Individual has it	**Team** mediates it	**Department** shares it	**Organization** shares it	**Environment** influences	
					Direct	**General**
Level 0	Not know	Not discussed	No vision	No vision	Null	Restrictive
1	Knows vision	Distribute	Top-down	Top-down	One	Indifferent
2	Personal vision	Create	Shared	Shared	Two	Supportive

Table 14: Vision map

Individual

- Not know: I (as individual entity) do not know the vision of the organization;
- Knows vision: I (as individual entity) know the vision of the organization;
- Personal vision: I (as individual entity) have participated in the development of the vision through presenting my personal views on what the vision should be.

Team

- Not discussed: The vision is not presented in the teams;
- Distribute: Teams are the medium through which the vision is distributed;
- Create: Teams are the platform through which the vision is created.

Department

- No vision: Our department does not have a clear vision;
- Top-down : The department vision is made by the top level management;
- Shared: Each department member can participate in the development of the vision.

Organization

- No vision: Our organization does not have a clear vision;
- Top-down : The organizational vision is made by the top level management;
- Shared: Each organizational member can participate in the development of the vision.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- Restrictive: The general environment has restrictive influence on development of a learning organization vision;
- Indifferent: The general environment has indifferent influence on development of a learning organization vision. It is not restricting it, but it also does not support it;
- Supportive: The general environment has supportive influence on development of a learning organization vision.

5.5.4.3 Strategy map

		Individual works it	**Team** enables it	**Department** has it	**Organization** has it	**Environment** influences	
						Direct	**General**
Level	**0**	Not know	Not discussed	Not clear	Not clear	Null	Restrictive
	1	Knows strat-egy	Distribute	Top-down	Top-down	One	Top-down
	2	Propose strat-egy	Create	Shared	Shared	Two	Shared

Table 15: Strategy map

Individual

- Not know: I (as individual entity) do not know the strategy of the organization;
- Knows strategy: I (as individual entity) know the strategy of the organization and, I am following it;
- Propose: I am able to participate in the development of the strategy and, present my personal views on what it should be.

Team

- Not discussed: Strategy is not presented in the teams;
- Distribute: The teams are the medium through which the strategy is distributed;
- Create : The teams are the platform through which the strategy is created.

Department

- Not clear: Our department does not have a clear strategy;
- Top-down: The strategy in the department is made by the top level management;
- Shared: Each department member can participate in the development of the strategy.

Organization

- Not clear: Our organization does not have a clear strategy;
- Top-down: The strategy in the organization is made by the top level management;
- Shared: Each organizational member can participate in the development of the strategy.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity), cooperate in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- Restrictive: The general environment is not supportive of strategy development;
- Top-down: The general environment is supportive of top down strategy development;
- Shared: The general environment has supportive of shared approach to development of strategy.

5.5.4.4 Culture map

Level	**Individual** has it	**Team** enables it	**Department** implies it	**Organization** implies it	**Environment** influences	
					Direct	**General**
0	Stop	No teams	Stop	Stop	Null	Stop
1	Bounded	Ad-hoc	Boundary	Boundary	One	Boundery
2	Open	Pivotal	Open	Open	Two	Open

Table 16: Culture map

Individual

- Stop: I, personally, believe that I (as individual entity) should take risk-less actions, make no mistakes, keep my opinion and ideas for me;
- Bounded: I, personally, believe that I (as individual entity) should take actions with moderate risk, make small mistakes, share my opinion and ideas with people I trust;
- Open: I, personally, believe that I (as individual entity) should be able to share my ideas, speak without being afraid, take actions with higher risks, make mistakes and be tolerated for that, make experiments.

Team

- No Teams: Teams are not needed, we are all individuals and it is each man for itself;
- Ad-hoc teams: Teams are needed to solve efficiency problems;
- Pivotal teams: Teams are needed in order to run the organization successfully.

Department

- Stop culture: The culture in our department is take risk-less actions, keep your opinion and ideas for you;
- Boundary culture: The culture in our department is take actions with moderate risk, share your ideas and opinion with your peers, make experiments with bounded impact;
- Open culture: The culture in our department is that people are able to share their ideas, speak without being afraid, make experiments, take actions with higher risks, mistakes are tolerated.

Organization

- Stop culture: The culture in our organization is take risk-less actions, keep your opinion and ideas for you;
- Boundary culture: The culture in our organization is take actions with moderate risk, share your ideas and opinion with your peers, make experiments with bounded impact;
- Open culture: The culture in our organization is that people are able to share their ideas, speak without being afraid, make experiments, take actions with higher risks, mistakes are tolerated.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity), cooperate in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- Stop culture: The culture in our general environment is not to be different, take risk-less actions, keep your opinion and ideas for you;
- Boundary culture: The culture in our general environment is take actions with moderate risk, share your ideas and opinion with your peers, make experiments with bounded impact;
- Open culture: The culture in our general environment is that people are able to share their ideas, speak without being afraid, make experiments, take actions with higher risks, and mistakes are tolerated.

5.5.4.5 Power map

Level	Individual has it	Team has it	Department makes it	Organization makes it	Environment influences	
					Direct	General
0	No	None	Concentrated	Concentrated	Null	Concentrated
1	Operational	Operational	Top down	Top down	One	Top down
2	Business	Business	Bottom up	Bottom up	Two	Bottom up

Table 17: Power map

Individual

- No empowerment: I (as individual entity) do not feel empowered;
- Operational empowerment: I (as individual entity) am given powers, that I do not normally have, to expand my influence on other people and areas on operational level;
- Business empowerment: I (as individual entity) am given powers, that I do not normally have, to expand my influence on other people on business level like strategy, vision.

Teams

- No empowerment: Teams do not feel empowered;
- Operational empowerment: The teams are given powers, that they do not normally have, to expand their influence on other people and areas on a operational level;
- Business empowerment: The teams are given powers, that they do not normally have, to expand their influence on other people and areas on business level like strategy, vision.

Department

- Concentrated power: The ones who have power do not distribute it;
- Top down empowerment: The department top management is distributing power in order to empower. The empowerment is managed by the department top management;
- Bottom up empowerment: Every individual is distributing its own power in order to empower other people with whom s/he works. The empowerment is guided by the department top management.

Organization

- Concentrated power: The ones who have power do not distribute it;
- Top down empowerment: The organization top management is distributing power in order to empower. The empowerment is managed by the organization top management;
- Bottom up empowerment: Every individual is distributing its own power in order to empower other people with whom s/he works. The empowerment is guided by the organization top management.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- Concentrated power: There are people and institutions that have concentrated power and do not share it;
- Top down empowerment: In our society you can be empowered only if the people and institutions that have the power give you power and empower you;
- Bottom up empowerment: In our society the power is not concentrated in several institutions and people. The power is distributed to large number of institutions and people.

5.5.4.6 Structure map

		Individual fits in	**Team** follows it	**Department** has it	**Organization** has it	**Environment** influences	
						Direct	**General**
Level	**0**	Not clear	No teams	Too hierarchical	Too hierarchical	Null	Too hierarchical
	1	Adaptive static	Functional	Hierarchical	Hierarchical	One	Hierarchical
	2	Adaptive	Organizational	Organic	Organic	Two	Organic

Table 18: Structure map

Individual

- Not clear: I (as individual entity) am not clear about my position and role in the organization;
- Clear fix: My (as individual entity) position and role in the organization are clearly determined and fixed for me in the existing structure of the organization;
- Adaptive: My (as individual entity) position and role in the organization are clearly determined by providing me flexibility to adapt and extend it.

Team

- No teams: The structure does not support teams and, teams are not created;
- Functional teams: The structure supports functional teams that are formed to work on operational issues in the organization;
- Organizational teams: The structure supports organizational teams that are formed to work on all organizational issues in the organization.

Department

- Too hierarchical structure: High number of levels and strict division of work;
- Hierarchical structure: Higher number of levels and clear division of work;
- Organic structure: Lowest number of levels and opportunities to take other additional roles in the department, the structure has embedded flexibility to change as needed.

Organization

- Too hierarchical structure: High number of levels and strict division of work;
- Hierarchical structure: Higher number of levels and clear division of work;
- Organic structure: Lowest number of levels and opportunities to take other additional roles in the organization, the structure has embedded flexibility to change as needed.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- Too hierarchical structure: The general environment is too hierarchical, too bureaucratic, fixed;
- Hierarchical structure: The general environment is with a higher number of levels, clear division of work, and sometimes change;
- Organic structure: The general environment is structured with the lowest number of levels, clear work roles, and it has embedded flexibility to change as needed.

5.5.4.7 Processes map

		Individual uses it	**Team** makes it	**Department** has it	**Organization** has it	**Environment** influences	
						Direct	**General**
Level	**0**	Not clear	No support	Not clear	Not clear	Null	Not clear
	1	Clear own	Support	Clear	Clear	One	Clear
	2	Clear fit	Relate	Modular	Modular	Two	Modular

Table 19: Process map

Individual

- Not clear: I (as individual entity) am not clear how to do my job, what processes I need to follow in order to successfully do my job;
- Clear own: It is clear to me how I (as individual entity) can do my job, what processes I need to follow in order to successfully do my job;
- Clear fit: I (as individual entity) know how the processes I follow for my job are interrelated with the other processes in the organization.

Teams

- No support: The teams do not provide support in identifying my work related processes;
- Support: The teams provide support in identifying my work related processes;
- Relate: Through teams we are able to relate our processes between each other and identify how we can fit our role in the organizational processes.

Department

- Not clear: The department does not have a clear definition of the working processes in the department and, there is no good integration of the different processes within the department;
- Clear: The department does have a clear definition of the working processes in the department and good integration of the different processes within the department;
- Modular: The department processes are modular and can be divided and rearranged without losing their power to produce the specific output.

Organization

- Not clear: The organization does not have a clear definition of the working processes in the organization and, there is no good integration of the different processes within the organization;
- Clear: The organization does have a clear definition of the working processes in the organization and good integration of the different processes within the organization;
- Modular: The organization processes are modular and can be divided and rearranged without losing their power to produce the specific output.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- Not clear: In the general environment, the working processes are not clear and there is not a good integration of the different processes in the general environment;
- Clear: In the general environment, the working processes are clear and there is a good integration of the different processes within the general environment;
- Modular: In the general environment, the working processes are modular and can be divided and rearranged without losing their power to produce the specific output.

5.5.4.8 Technology map

		Individual supported as	**Team** uses it for	**Department** has	**Organization** has	**Environment** influences	
						Direct	**General**
Level	**0**	Passive receiver	Presentation	Communication	Communication	Null	Communication
	1	Active receiver	Exchange	Storage	Storage	One	Storage
	2	Creator	Collaborate	Co-creation	Co-creation	Two	Co-creation

Table 20: Technology map

Individual

- Passive receiver: Technology I (as individual entity) use enables me to only passively receive information with very limited possibility for exploring the received information;
- Active receiver: Technology enables me (as individual entity) to actively receive information. It enables me to search for the information, structure the form of information and drill down the information;
- Creator: Technology enables me (as individual entity) to successfully create, structure and

share information.

Team

- Presentation: The team I (as individual entity) work in has a technology through which the information is presented to them;
- Exchange: Technology enables the teams, I (as individual entity) work in, to exchange information among them;
- Collaborate: Technology enables the teams to collaborate in creation.

Department

- Communication: Technology the department has, is mainly oriented to facilitate the communication;
- Storage: Technology the department has, enables storage of data and information and enables easy retrieval of data and information;
- Co-creation: Technology the department has, enables co-creation of data, information and knowledge by different individuals.

Organization

- Communication: Technology the organization has, is mainly oriented to facilitate the communication like telephone and email;
- Storage: Technology the organization has, enables storage of data and information and enables easy retrieval of data and information;
- Co-creation: Technology the organization has, enables co-creation of data, information and knowledge by different individuals.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- Communication: Technology that is used in the general environment is mainly oriented to facilitate the communication;
- Storage: The technology that is used in the general environment enables storage of data and information, and enables easy retrieval of data and information;
- Creation: The technology that is used in the general environment enables co-creation of data, information and knowledge by different individuals and institutions.

5.5.4.9 Leadership map

		Individual is	**Team** shows it	**Department** has it	**Organization** has it	**Environment** influences	
						Direct	**General**
Level	**0**	Not leader	No leader	No clear leadership	No clear leadership	Null	No clear leadership
	1	Transactional	Manager as leader	Leaders from top	Leaders from top	One	Leaders from top
	2	Transformational	Team leader	Ecology of leadership	Ecology of leadership	Two	Ecology of leadership

Table 21: Leadership map

Individual

- Not leader: I (as individual entity) am not a leader;
- Transactional leader: I (as individual entity) am a leader that focuses on increasing the efficiency, establishing and standardizing procedures;
- Transformational leader: I (as individual entity) am a leader that makes the people go beyond the borders by challenging things.

Team

- No leader: We, as members of the team, do not have leaders in the teams, we have a chair but not a leader;
- Manager as Leader: The managers of the teams are recognized as leaders;

- Team leader: The leader is identified from the team members.

Department

- No clear leadership: The department does not have leaders, it has managers, but not leaders;
- Leaders from top: The leaders are concentrated at the top of the department;
- Ecology of leadership: The leaders are found at any level of the department.

Organization

- No clear leadership: The organization does not have leaders, it has managers, but not leaders;
- Leaders from top: The leaders are concentrated at the top of the organization;
- Ecology of leaders: Leaders are found at any level of the organization.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- No clear leadership: In the general environment we do not have leaders;
- Leaders from top: The leaders are concentrated at the top of the general environment;
- Ecology of leadership: Leaders can be found at any level and part of the general environment.

5.5.4.10 Change map

Level	Individual practices	Team spreads	Department has done it	Organization has done it	Environment influences	
					Direct	**General**
0	Static	Standing together	No change	No change	Null	No change
1	Steps	Walking together	Efficiency change	Efficiency change	One	Incremental
2	Run	Running together	Business change	Business change	Two	Transformational

Table 22: Change map

Individual

- Static: I (as individual entity) do not want to change and I do not see the need for a change at work;
- Steps: I (as individual entity) have made small incremental changes that improved my work and me personally;
- Run: I (as individual entity) have made radical transformational changes that have significantly improved my work and me personally.

Team

- Standing together: In the teams we are satisfied as we are and we do not discuss what can be changed and how it can be changed;
- Walking together: Teams are the base through which we propose and make incremental change;
- Running together: Teams are the base through which we propose and make transformational change.

Department

- No change: Most of the things we do here are done in the same way for a longer period;
- Efficiency change: We make changes directed towards efficiency improvement;

- Business change: We make changes that change our business.

Organization

- No change: Most of the things we do here are done in the same way for a longer period;
- Efficiency change: We make changes directed towards efficiency improvement;
- Business change: We make changes that change our business.

Direct environment

- Null: The entities (individuals, teams, departments, organizations) with which I (as individual entity) cooperate, in our direct environment (competitors, customers, suppliers, strategic partners, distributors), are at level 0;
- One: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 1;
- Two: The entities with which I (as individual entity) cooperate, in our direct environment, are at level 2.

General environment

- No change: The things in the general environment are done in the same way;
- Incremental changes: The things are changed incrementally;
- Transformational change: The things are changed through transformational change.

5.5.5 Learning Organization Atlas

An atlas is a collection of facets maps. The atlas enables the process of layering and de-layering the individual facets' maps. Because the same grid is used to create the individual facet maps the following information can be obtained:

- alignment of individual entity in different facets (for example Figure 35 shows the alignment between only four facets); and

- alignment of different entities on same or different facets.

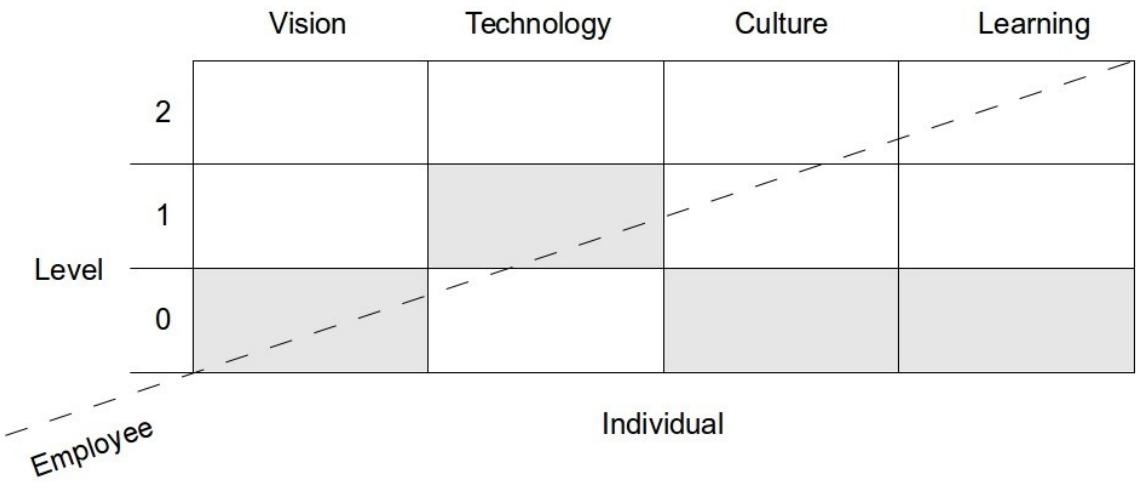

Figure 35: Alignment of Individual entity - Employee stakeholder on different facets

5.5.6 Learning Organization Roadmap

The Learning Organization Road Map (LORM), based on results of the Learning Organization Atlas (LOA), provides guidelines to the organizations, their learning needs, and the required changes to be made. LORM is built on the propositions made by the map model of Rolland et al. (1999). According to them, a map is a process model in which a non-deterministic ordering of intentions and strategies has been included. The map is composed of one or more sections (Rolland and Prakash, 2001). A section is an aggregation of two kinds of intentions, the source and target intentions together with a strategy represented as < source intention Ii, target intention Ij, strategy Sij>. An intention is a goal that can be achieved through the performance of a process. There are two special intentions, Start and Stop, to begin and end the map respectively. A strategy is an approach, a manner to achieve an intention. It characterizes the flow from Ii to Ij and the way Ij can be achieved. Because the next intention and strategy to achieve it are selected dynamically, guidelines that make all choices available, open to handle a given situation are of great importance. The map has three guidelines,

- 'Intention Selection Guideline' per node Ii, except for Stop. Given an intention Ii, an Intention Selection Guideline (ISG), identifies the set of intentions {Ij} that can be achieved in the next step;

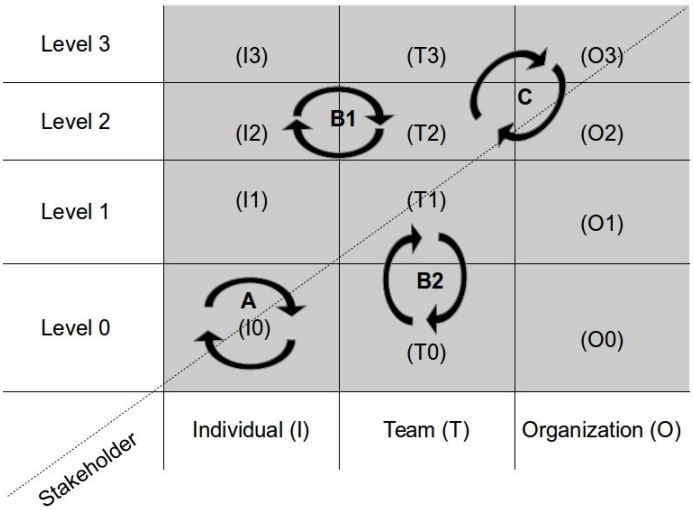

Figure 36: Relations between the cells in the grid

- 'Strategy Selection Guideline' per node pair <Ii,Ij>. Given two Intentions Ii, Ij, and a set of possible strategies Sij1, Sij2, ..Sijn applicable to Ij, the role of the Strategy Selection Guideline (SSG) is to guide the selection of a Sijk;
- 'Intention Achievement Guideline' per section <Ii,Ij,Sij>. Intention Achievement Guideline (IAG) that provides an operational or an intentional means to fulfil a business intention applying a given strategy Sij.

The guidelines that are developed for the learning organization road map are influenced by the relations identified between the cells in the facets. Four types of relations between the cells are identified (Figure 36):

1. intra-cell (A);
2. intra-level and inter-entity (B1);
3. intra-entity and inter-level (B2);
4. inter-level and inter-entity (C);
5. inter-map are the relations between the cells of different facets. All the previous relations are a part of this type of relation and, can result in translational (i.e. adaptive) and transformational changes (as presented in Figure 6).

These relations impact the elements of the dynamic model trigger box, engine, indicators and feedback.

5.5.6.1 Triggers

Based on the five identified relations, five types of triggers are developed. Each trigger is explained in the tables developed in chapter 2: Approach to solution. Then a practical example for each trigger is provided.

Trigger name	Intra-cell
Belongs to	All facets, individual map
Information source	Questionnaire section for that cell
Time frame	6 to 12 months
Values	Confirm state presence on Learning level/ Negate state presence on Learning level
Decision rules	if Learning level 0 state present then minimize if Learning level 1 state present then improve if Learning level 2 state present then maximize
Influences what	one level, one entity, multiple stakeholders, one facet

Table 23: Intra-cell trigger

Example: Based on the questionnaire results, it is identified that, for the entity Individual in the Learning facet, the presence of the state Transactional is confirmed. Because the state Transactional is on Learning Level 0 and the decision rule is "if Level 0 state present then minimize" (Table 23) the decision is to minimize the presence of Transactional state. The reason for minimization is that Transactional state of entity Individual does not involve learning, but mere receiving of information, and as such, is not in line with the learning attribute – type of learning and should be minimized.

Trigger name	Intra-level and Inter-entity
Belongs to	All facets, individual map
Information source	Questionnaire sections for cells on the same level for different entities
Time frame	6 to 12 months

Values	Confirm state presence on Learning level/ Negate state presence on Learning level
Decision rules	If Learning level 0 aligned then minimize if not, align and then minimize if Learning level 1 aligned then improve if not, align then improve if Learning level 2 aligned then maximize if not, align then minimize
Influences what	one level, multiple entities, multiple stakeholders, one facet

Table 24: Intra-level and Inter-entity trigger

Example: Based on the questionnaire results, it is identified that in the Learning facet the entity Individual has the state, represented as cell, Adaptive (Learning level 1), the entity Team has the state, represented as cell, Discuss (Learning level 1) and the entity Department has the state, represented as cell, Store (Learning level 1). However, based on the questionnaire results, it can be identified that the state Adaptive (for entity Individual) and the state Discuss (for entity Team) are strongly present, while the state Store (for entity Department) is weakly present. Based on the decision rule, "if Level 1 aligned then improve if not, align then improve" (Table 24) the presence of Department on Store state should be aligned with the other two states (Adaptive and Discuss) and then the presence of all the states should be improved.

Trigger name	Intra-entity and Inter-level
Belongs to	All facets, individual map
Information source	Questionnaire sections for cells for the same entity on different levels
Time frame	6 to 12 months
Values	Aligned states on Learning level/ Misaligned states on Learning level
Decision rules	If Learning level 0 is present minimize it, then move to Learning level 1 if Learning level 1 is present improve it, then move to Learning level 2 if Learning level 2 is present, maximize it
Influences what	multiple levels, one entity, multiple stakeholders, one facet

Table 25: Intra-entity and Inter-level trigger

Example: Based on the questionnaire results, it is identified that in the learning map, the entity Individual has presence on the state Transactional (Learning level 0). Because the transactional state of entity Individual does not involve learning (as presented in Table 13) the decision rule "if Learning level 0 present minimize it, then move to Learning level 1" is applied and the entity Individual's Transactional state (Learning level 0) should be minimized and then moved to entity Individual's state Adaptive (Learning level 1).

Trigger name	Inter-level and Inter-entity
Belongs to	All facets, individual map
Information source	Questionnaire sections for cells for different entities on different levels
Time frame	6 to 12 months
Values	Aligned states on Learning level/ Misaligned states on Learning level
Decision rules	If entity X is on Learning level 0 and Entity Y is on Learning level 1 then for entity X minimize Learning level 0 then move to Learning level 1, while for entity Y improve Learning level 1 If entity X is on Learning level 1 and Entity Y is on Learning level 2 then for entity X improve Learning level 1 then move to Learning level 2, while for entity Y maximize Learning level 2

Influences what	multiple levels, multiple entities, multiple stakeholders, one facet

Table 26: Inter-level and Inter-entity trigger

Example: Based on the questionnaire results, it is identified that in the Learning map, the entity Individual has presence on state Adaptive (Learning level 1), the entity Team has presence on state Meet (Learning level 0) and the entity Department has presence on state Disseminate (Learning level 2). In order to align the states of the entity Individual, Team and Department on Learning level 2 and, taking into account the decision rules presented in table 26, the Individual should improve state Adaptive and move to Transformative state (Learning level 2); Team should minimize state Meet, move to state Discuss (Learning level 1) then, improve state Discuss and move to state Dialogue (Learning level 2); Department should maximize the Disseminate state (Learning level 2).

Trigger	Inter-map
Belongs to	All facets, all maps
Information source	Questionnaire sections for cells for different entities on different levels in different maps
Time frame	6 to 12 months
Values	Aligned states on Learning level/ Misaligned states on Learning level
Decision rules	If entity X, on map X is on Learning level 0 and Entity Y, on map Y is on Learning level 1 then for entity X minimize Learning level 0 and then move to Learning level 1, while for entity Y improve Learning level 1 If entity X, on map X is on Learning level 1 and Entity Y, on map Y is on Learning level 2 then for entity X improve Learning level 1 then move to Learning level 2, while for entity Y maximize Learning level 2
Influences what	multiple levels, multiple entities, multiple stakeholders, multiple facets

Table 27: Inter-map trigger

Example: Based on the questionnaire results, it is identified that in the Learning map, the entity Individual has presence on state Adaptive (Learning level 1), while the entity Team on the Vision map has presence on state Not discussed (Learning level 0). Thus, there is a misalignment of the states between different entities (Individual and Team) on different maps (Learning and Vision

map). In order to align, and based on the decision rules presented in table 27, the entity Individual needs to improve its presence on state Adaptive (Learning level 1) on the Learning map and, the entity Team needs to minimize its presence on state Not discussed (Learning level 0) and move to state Distribute (Learning level 1) on the Vision map.

5.5.6.2 Engine

The identified relations also influence the engine of the dynamic model. Based on that, different sections of the road map have been developed, and each section includes the intentions, strategies and relationships, as presented in the following tables.

The intra-cell relation creates three sections (Table 28, 29, 30). There is a need for each section because the learning level on which the cell is located imposes different intentions. However, the strategy type for achieving these intentions is the same, translational type of strategies. Translational type of strategies are - strategies that have influence on cell/cells within one learning level. The loop relationships means that the same cell is the starting and the ending point.

Section name	Intra-cell (Learning level 0)
Intentions	Minimize state on Learning level 0
Strategies	Translational (within one Learning level)
Relationships	Loop

Table 28: Section Intra-cell (Learning level 0)

Section	Intra-cell (Learning level 1)
Intentions	Improve state on Learning level 1
Strategies	Translational (within one Learning level)
Relationships	Loop

Table 29: Intra-cell (Learning level 1)

Section	Intra-cell (Learning level 2)
Intentions	Maximize state on Learning level 2

Strategies	Translational (within one Learning level)
Relationships	Loop

Table 30: Intra-cell (Learning level 2)

The intra-level and inter-entity, although it is a section for three learning levels (Learning level 0, 1 and 2), it has the same Intention, Strategies and Relationships (Table 31). The intention is to align the different entities that are on the same learning level, but have different state presence.

Section	Intra-level (Learning level 0, 1, 2) and Inter-entity
Intentions	Align on Learning level 0 Align on Learning level 1 Align on Learning level 2
Strategies	Translational (within one Learning level)
Relationships	Loop

Table 31: Intra-level (Learning level 0, 1, 2) and Inter-entity

Following the identified generative mechanism and the ontological relations, **embeds_in** and **transcends_and _includes** in order to achieve the intentions in the Intra-level (Learning level 0, 1, 2) and Inter-entity section, the intentions of the intra-cell should be achieved. This means that in order to align on Learning level 1 the different states that entity Individual and Team have, the intention Improve state on Learning level 1 should be separately achieved for entity Individual and entity Team.

The intention of the intra-entity and inter-level (Learning level 0, 1, 2) section (Table 32) is to move the same entity to the next learning level. This can be achieved by using a transformational type of strategies. Transformational type of strategies are strategies that influence the entity to move from cell on one learning level to a cell on the next learning level.

Section	Intra-entity and Inter-level (Learning level 0, 1, 2)
Intentions	Move on Learning level 1 Move on Learning level 2

Strategies	Transformational (between different Learning levels)
Relationships	Directive from Learning level 0 to Learning level 1 to Learning level 2

Table 32: Intra-entity and Inter-level (Learning level 0, 1, 2)

In the intra-entity and inter-level (Learning level 0, 1, 2) section the entities can move to a Learning level 1 and stop and stay in that state, or they can continue and move to Learning level 2. To achieve these intentions a number of different transformational strategies can be used.

The same type of transformational strategies are used for the section Inter-level (Level 0, 1, 2) and Inter-entity (Table 33). However, the intention here is to achieve alignment on next level between different entities that are on different levels.

Section	Inter-level (Learning level 0, 1, 2) and Inter-entity
Intentions	Align different entities from Learning level 0 on Learning level 1 Align different entities from Learning level 1 on Learning level 2
Strategies	Transformational (between different Learning levels)
Relationships	Diagonal from Level X to Level X+1

Table 33: Inter-level (Learning level 0, 1, 2) and Inter-entity

The achievement of the intentions in the Inter-level (Learning level 0, 1, 2) and Inter-entity section depends on the achievement of the intentions in the Intra-entity and Inter-level (Learning level 0, 1, 2) section. The identified **embeds_in** and **transcends_and _includes relations** are in order to achieve the intention Align different entities from Learning level 0 on Learning level 1 from section Inter-level (Level 0, 1, 2) and Inter-entity, the intention Move on Learning level 1 from section Intra-entity and Inter-level (Learning level 0, 1, 2) should be achieved. While, for the intention Align, different entities from Learning level 1 on Learning level 2 from section Inter-level (Level 0, 1, 2) and Inter-entity the intention Move on Learning level 1 from section Intra-entity and Inter-level (Learning level 0, 1, 2) should be achieved.

Finally, the section Inter-map (Level 0, 1, 2) integrates the previous sections through their application across different maps (Table 34). The intention is to achieve alignment between maps. To achieve this, translational and transformational type of strategies can be used.

Section	Inter-map (Level 0, 1, 2)
Intentions	Align between maps
Strategies	Translational (within one Learning level) and Transformational (between different Learning levels)
Relationships	Integral

Table 34: Inter-map (Level 0, 1, 2)

The achievement of the intention in the section Inter-map is the most complex because based on the relations **embeds_in** and **transcends_and _includes**, to achieve this intention the intentions in the previous sections will need to have be achieved. This imposes high demands and realization of different strategies by the learning organization in order to achieve the intention – align between maps.

Graphically, all the sections are presented in Figure 37.

The roadmap represents the current understanding of the intentions and strategies based on the literature analysis outputs presented in the state of art and ontology chapters. However, in the future the presented roadmap will be refined and improved through additional literature and empirical research.

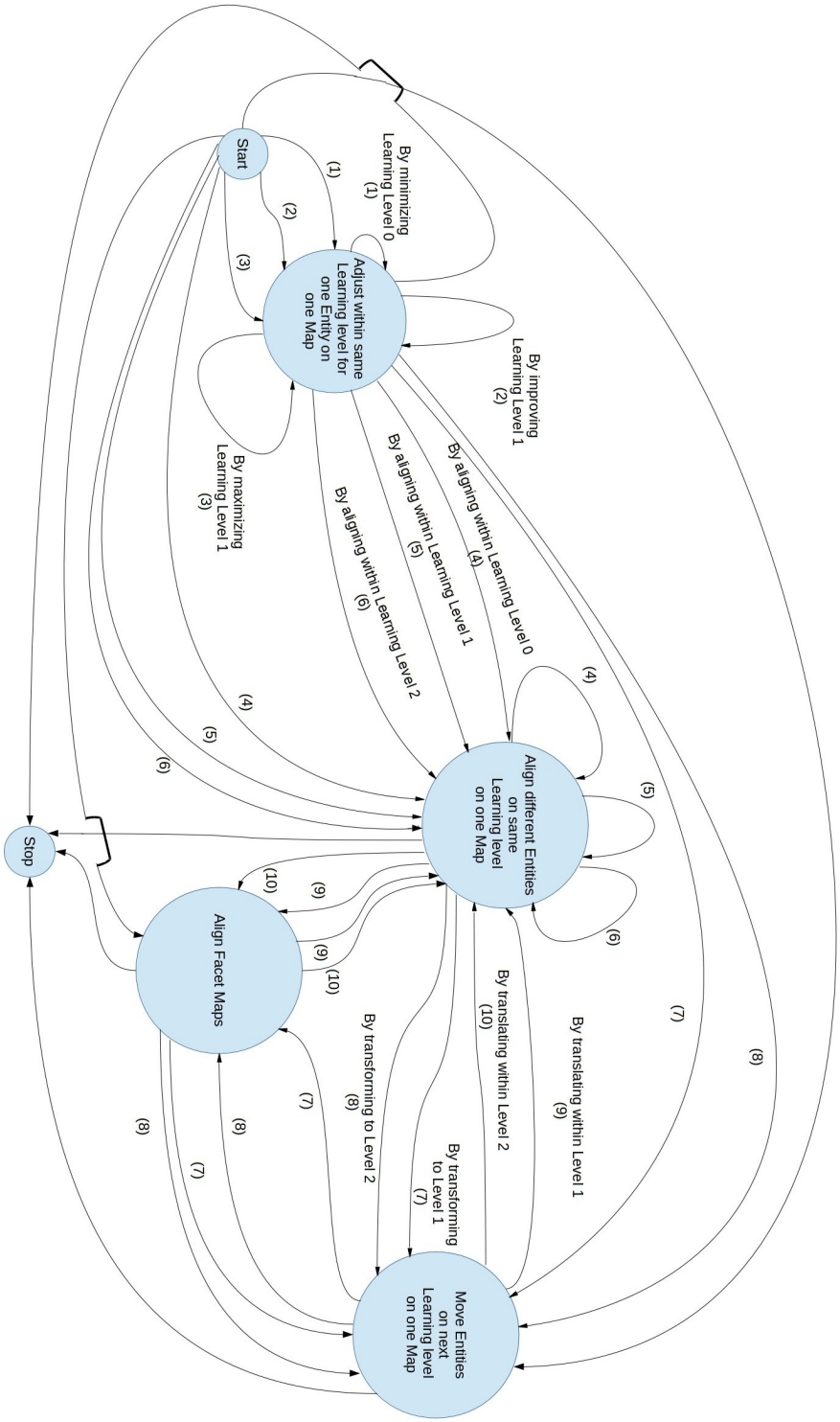

Figure 37: Roadmap

5.5.6.3 Indicators

The indicators, through which the measurement of intentions achievement will be measured, are based on the presence of state. The state is divided into three equal parts. One part indicates minor presence of state, the other part indicates average presence of state, and third part indicates major presence of state. This indicator is presented in Table 35.

Indicator name	State presence
Values	Minor, Average, Major

Table 35: Indicator State presence

By using an intention-driven model, it is easier to highlight the business intentions and strategies. Furthermore, the road map model provides a priori flexibility since the navigation will be dynamically performed during the execution.

5.5.6.4 Feedback

The feedback is connected with the redo of the questionnaire. This process should be repeated every year after the realization of the strategies. By comparing the new with the old alignment map, we can identify the progress and see where no improvement has been made.

5.6 Conclusion

In this chapter the Learning Organization Atlas Framework, as a multivariate framework for modeling the continuous transformation to learning organization, is presented. This framework includes the facets, lenses, grid, maps, atlas and roadmap. Through its use the organizations should get a better picture of their organization's standing regarding the learning organization characteristics and, identify how they can move forward in building their organization as a learning organization. Additionally, the framework brings the following benefits:

- it is modular and has made a clear distinction and separation between its elements: facets, lenses, grid, atlas and roadmap. This enables the modeler if s/he needs to make any changes in one element, not to make changes in the other element;
- The flexibility is embedded in each element. If there is a need to add a new facet or subtract an existing facet, this can be done. Also, a new entity or new stakeholder can be easily added or subtract. The only difference is the depth of understanding. If, for

example, the department entity is added, the values in the other entities are more clarified and the influence among them can be better understand;

- The framework can be easily used for visualization of the as-is position of different entities on different facets and their alignment. Furthermore, it can be used to present the to-be position of the enterprise and clearly identify where changes need to be made.

However, to achieve these benefits, a practical tool is needed as instantiation of the Learning organization atlas framework to be created. The following chapter will present the web tool.

Mijalce Santa

Chapter 6

Learning Organization Atlas Framework Web Tool

Mickey: Ya stay until the job is done
Movie “Snatch” [Ritchie, 2001]

6.1 Objective

According the design science research methodology one of the research outputs is instantiation. Instantiation is a realization of an artefact in its environment [March and Smith, 1995]. The instantiation operationalize the constructs, models and methods, and as such, demonstrates their feasibility and effectiveness [March and Smith, 1995]. The objective of this chapter is to present the web tool as an instantiation of the learning organization atlas framework.

To achieve this objective, first the related work regarding diagnostic tools is presented. Then, the web tool is presented, and its elements: identify, atlas, alignment and roadmap are explained. In identify section the questionnaires, their structure and their realization is presented. After that, in the atlas section the process of conversation of the questionnaires results in maps is presented. In the next section the alignment mechanism is presented. Regarding the roadmap section, its repository and matching process is presented. At the end, a conclusion is made.

6.2 Related work

In the past two decades a number of diagnostics instruments have been developed like Learning company blueprint [Pedler et al., 1991], Dimensions of the Learning Organization Questionnaire [Watkins and Marsick, 1993; Yang et al., 2004], Learning organization profile [Marquardt, 1996], Organizational Learning Survey [Goh and Richards, 1997], and the Learning organization survey [Garvin et al., 2008].

Learning company blueprint [Pedler et al., 1991]

Their tool is based on 11 dimensions or features of a Learning company. These features are later separated into 55 statements through which they are evaluated. There is no information on transformation of these statements into questions for a survey and, the scale on which they will be answered, or for interviews.

Dimensions of the Learning Organization Questionnaire [Watkins and Marsick, 1993; Yang et al., 2004]

Through this tool the seven dimensions of the learning organization identified by Watkins and Marsick [1993]. These dimensions are: continuous learning, inquiry and dialogue, team learning, empowerment, embedded system, system connection, and strategic leadership. Additionally, the questionnaire includes two measures of organizational performance: gain of organizational

knowledge and increase of organization financial performance. For each of the dimensions a list of questions are given. The respondents answer on a six-point Likert-type scale that ranged from "almost never true" to "almost always true". The tool was tested through empirical research on 836 subjects from multiple organizations.

Learning organization profile [Marquardt, 1996]

The questions are given in five areas:

- Learning dynamics: Individual, Group/ Team and Organizational;
- Organization Transformation: Vision, Culture, Strategy, and Structure;
- People empowerment: Employee, Manager, Customer, Alliances, Partners, and Community;
- Knowledge management: Acquisition, Creation, Storage/ Retrieval, and Transfer/ Utilization;
- Technology application: Information systems, technology-based learning, and electronic performance support systems.

The respondents can give answers on the following scale: 4 – applies totally; 3 – applies to a great extent; 2 – applies to a moderate extent; 1 – applies to a little or no extent.

Organizational Learning Survey [Goh and Richards, 1997]

The logic behind this tool is that organizational learning happens only when there is a certain set of organizational characteristics and management practices that enable the transfer of individual and group learning to organizational. The tool assesses if this set of characteristics` is present in the organizations. The survey is divided into five sub-scales: clarity of purpose, leadership, experimentation and rewards, transfer of knowledge, and teamwork. 21 questions are separated through these sub-scales. The highest possible score is 7, the lowest is 1. The survey is tested on 632 responses from staff at all levels in the organization.

The Learning Organization Diamond Tool [Moilanen, 2001]

The tool consists of five elements: driving forces, finding purpose, questioning, empowering and evaluating. These elements in the tool are viewed from two sides: individual and organizational. Through a questionnaire, with 40 clustered statements, 20 for the organizational and 20 on the individual level, data is collected. After the collection process, the data is re-clustered according to the five elements of the tool and analyzed in that way. Through the combination of levels and

elements, a holistic picture of the organization is created and the present state of the learning organization is identified. Also, separate portrayals on individual and organizational level can be created. The survey instrument was tested in a group of 691 respondents and 25 organizations in the period from 1997 to 1999.

A four level learning organization benchmark [Phillips, 2003]

The tool combines attributes and functions. The author, through literature review identifies 10 attributes of the ideal learning organization: Will, Leadership, Strategic thinking and vision, Communication, Learning and development, innovation and decision making, change management, intellectual capital and knowledge management, measurement and assessment, and reward and recognition. A questionnaire with questions for these attributes, in total 193. The questionnaires were applied to four functional areas: CEOs, human resources or learning development managers, line managers and employees. On a scale of 1 to 4 the respondents ranked the importance and the extent of their implementation. The tool was used for empirical research in 2001.

Learning organization survey [Garvin et al., 2008]

Through this tool, the organizations can assess the depth of learning in their organizations and its individual units, and to compare their results within the organization, with other organizations and established benchmarks. The tool measures the three building blocks of the learning organization and their sub-components:

- A supportive learning environment: Psychological safety, Appreciation of differences, Openness to new ideas and Time for reflection;
- Concrete learning processes and practices : Experimentation, Information collection, Analysis, Education and training and Information transfer;
- Leadership that reinforces learning.

For each subcomponent, respondents answer on number of questions on a seven-point scale from highly inaccurate to highly accurate. The tool was used in 2006 on a survey with 225 executives.

However, only the Dimensions of the Learning Organization Questionnaire and the Learning organization survey have online tools.

The Dimensions of the Learning Organization Questionnaire (DLOQ) can be found at www.partnersforlearning.com/instructions.html. The tool is a questionnaire with five sections:

individual level, team or group level, organization level, measuring performance at the organizational level and additional information about you and your organization. For each question, the answers are provided on a six points likert scale, from almost never and almost always. When all the questions are answered, a chart is created for nine dimensions: continuous learning, dialogue and inquiry, team learning, embedded systems, empowerment, system connections, provide leadership, financial performance and knowledge performance.

Learning organization survey (LOS) tool can be found at http://los.hbs.edu. This tool evaluates the work units on the learning building blocks and, benchmarks them against the results from author's research. The building blocks are: supportive learning environment, concrete learning processes and practices and leadership that reinforce learning. When all the questions are answered, a score is estimated for each building block and subcomponent. The scores are converted to 0-to-100 scale to be easily comparable. The results can be compared with benchmarks that they have established in their previous research.

6.3 Web tool overview

Based on the learning organization atlas framework concept, the web tool is created, as its instantiation [Santa et al., 2014]. The tool is available at www.atlasframework.info. The tool is divided into four sections: identify, atlas, alignment and roadmap (Figure 38).

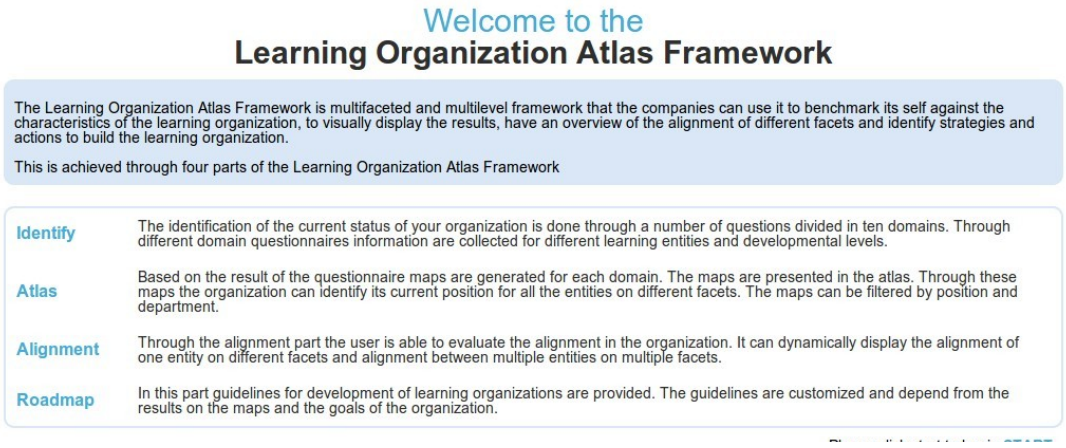

Figure 38. First page of the web tool

6.3.1 Identify

The goal of the identify section is to collect data about the as-is state of the organization willing

to become a learning organization. The identify section instantiates the learning organization facets and grid through ten questionnaires, one for each facet. The questions in the questionnaires are developed and structured to evaluate the presence of facets' attributes per entity (ecological lens) and per level (developmental lens) (Figure 39). Furthermore, by registering the respondent's position in the beginning, the stakeholder lens is also included.

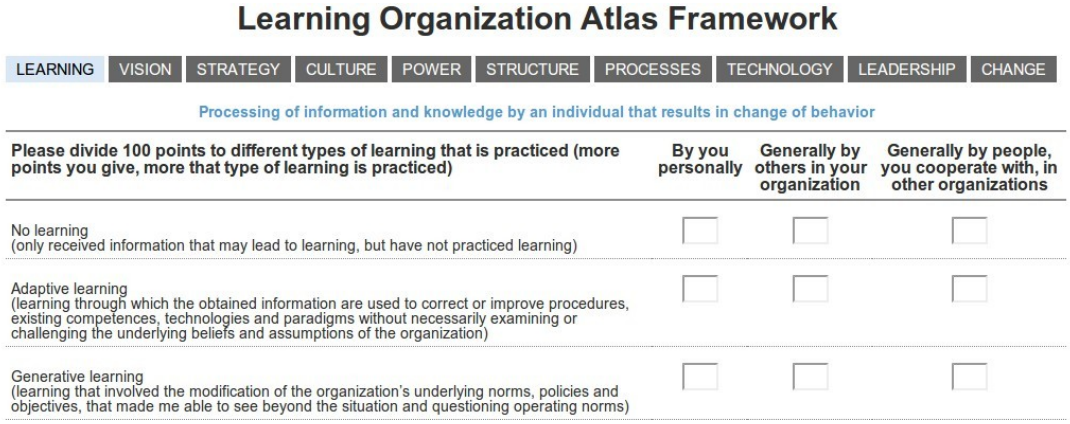

Figure 39. Questionnaires part of the web tool

6.3.1.1 Questionnaire

According to Creswell [2008], the survey should provide a quantitative description of the opinions of the targeted sample. One important aspect of the survey methodology is the questionnaire through which the data will be collected. Through the questionnaire we can measure objective facts or subjective states [Fowler, 2008]. The learning organization is in itself a subjective state, thus, the majority of the questions will focus on measuring subjective states. However, the answers of subjective states are harder to validate, and in order to avoid the error associated with states [Fowler, 2008], it is necessary for the questions to be formatted in accordance with what they measure [Fowler, 1995]. To achieve this, I followed the guidelines of Fowler [2008; 1995]. To meet the principles proposed by Fowler [1995] the following actions were taken :

- The questions were formed to ask the respondents for their first hand experience, their current situations, their feelings and perceptions;
- Each question asks one question at a time;
- Steps were made to ensure that each respondent is answering the same question: simple words were used, definitions for the facets were provided in the beginning, the time period was defined as the past two years;

- Before the survey session, the different types of questions were explained, and a guideline how to answer the questions was presented;
- Additional steps were made to organize the questions per facet in one sheet, and to make a pattern that is applied to each questionnaire facet.

However, because the goal is to evaluate ten facets, the result is a large number of questions and possible answers. Furthermore, because we evaluate more entities for majority of the questions, each respondent needed to give an answer to the same question, but for different entities.

6.3.2 Atlas

The atlas contains all the facet maps created through the analysis of the answered questionnaires (Figure 40). Each cell on the map contains characteristics that an entity should have in order to be on that developmental level. For example, for entity "Team" to be on the developmental level 1 named "Discuss" the following characteristics should be present: "In the teams different views are presented and defended, and there is a search for the best view to support decisions that must be made at this time". The positioning of the entity on the developmental level is a result of the calculations performed with the questionnaire answers. However, different respondents, based on their experience, can position the same entity on different levels. In the maps, this situation is represented by the extent to which the cell is filled in. The more the cell is filled in, the more respondents think that that entity has stronger presence on that learning level.

Presenting the questionnaire results, in this form and structure in the atlas, has two implications for research on building the learning organization:

- the learning organization is not a clear cut state, but rather a mix of partially achieved levels by different entities;
- building the learning organization, even in the same organization, starts from different points for different entities and stakeholders.

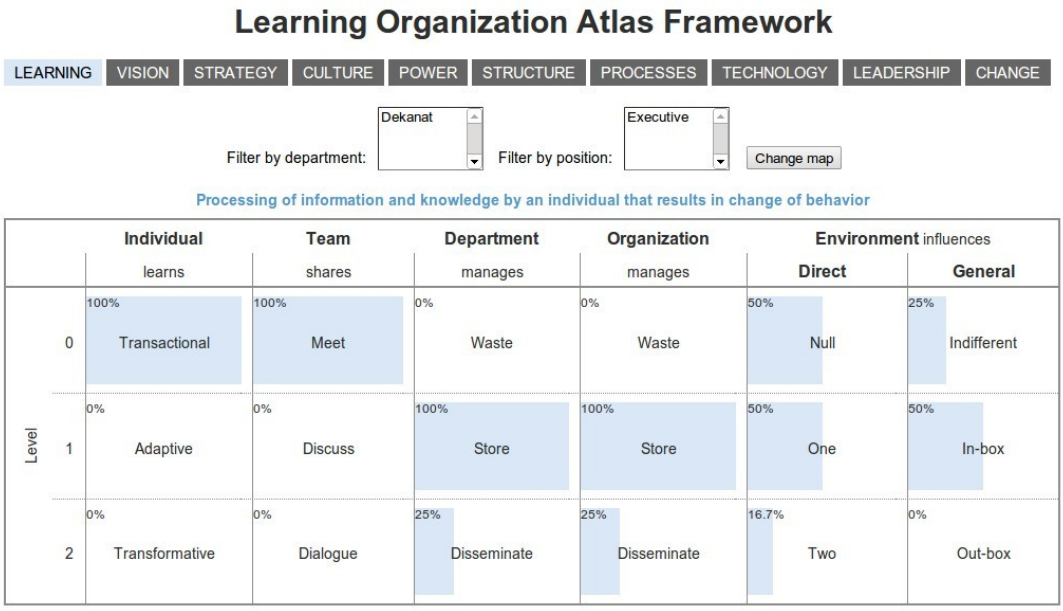

Figure 40. Maps of different facets

6.3.2.1 Mapping the questionnaire results

The mapping of the questionnaire and the transfer of the questionnaire results in the maps was done in three steps:

- Indexing;
- Value determination;
- Calculation.

The purpose of the indexing is to easily identify which answers should be included in the calculation in order to determine the values of the maps' cells. The indexing structure is as follows:

- The first number – it indicates the table in which the questionnaire is (for example 1);
- The second number – it indicates the position of the question in the table (for example 1). Now the index is 1-1;
- The letter – it indicates the entity to which this question refers (for example “a” for the first entity in that question, be for the next entity in the same question and c for the third entity in the same question). Now the index is 1-1a;
- The third number – it indicates the position of the possible answer (for example 1). Now the index is 1-1a1.

The index 1-1a1 means that we are referring to the first answer option for the individual entity for

the first question in the first table. All the indexed questionnaires are available in Appendix C.

The purpose of the value determination is to assign weight to different answers in the same question (Table 36). These weights are used as input for the calculation. Through the formulas, different answers will be used to populate different cells. Thus, in the table, an explanation is provided for the values of certain answers. The impact of these weights is further explained in the calculation part.

Type of questions	Assigned weights to answers	Additional explanation
Sum-up questions	From 0 to 100	Each answer can have a value from 0 to 100, however the sum of all the values of all the answers for one question should be 100.
Frequency type of questions	Always.....4 points Often.....3 points Sometimes.....2 points Rarely.....1 point Never.....1 point I don't know.....0 points	Options Always, Often, Sometimes and Rarely contribute to one cell in the map. Option Never contributes to another cell for the same entity on the same map
	All.....3 points Majority.....2 points Minority.....1 point None.....1 point	Options All, Majority, Minority contribute to one cell in the map. Option None contributes to another cell for the same entity on the same map
Level of agreement	Strongly agree.....2 points Agree.....1 points Neutral.....0.5 / -0.5 points Disagree.....-1points Strongly disagree...-2 points I don't know.....0 points	Options Strongly agree, Agree and Neutral (positive) contribute to one cell in the map. Options Neutral (negative), Disagree, Strongly disagree contribute to another cell for the same entity on the same map
Sliding questions	Option 1.....100/0	The values represent the presence of a characteristic. The options are relations of

	Option 2.....75/25 Option 3.....50/50 Option 4.....25/75 Option 5.....0/100	presence between two characteristics (for example Operational or Transformational leader)
Yes/No questions	Yes.....1 point No.....1 point	"Yes" contributes to one cell in the map. "No" contributes to another cell for the same entity on the same map
Check-in questions	Selected.....1 point Not selected.....1 point	Selected option contributes to one cell in the map. Not selected option contributes to another cell for the same entity on the same map
	Level 3.....2 points Level 2.....1 point Level 1.....1 point Level 0.....0 points	Options Level 3 and 2 contribute to one cell in the map Option Level 1 contributes to another cell for the same entity on the same map

Table 36: Weights for questions' answers

6.3.2.2 Calculation

The purpose of the calculation is to transfer the values of the answers that the respondents gave to appropriate cells, and populate those cells with the appropriate colour according to the provided answers. The logic of the calculation is presented here, while the formulas for each concrete cell are presented in Appendix D.

Sum up questions: each respondent adds a value for the answer options. Those values are summed up and divided by the number of the respondents. Example: four respondents provide the following values for the transactional learning 20, 30, 40, and 70. The sum 160 is divided by 4 respondents. The resulting value 40 indicates that 40% of the transactional learning cell should be coloured with the appropriate colour.

Frequency questions: These questions contribute to different cells for the same entity on the same map, thus there are two formulas that use parts of the answer options. For the answer options Always, Often, Sometimes and Rarely the calculation is: the number of respondents per option is multiplied by the answer option weight, they are summarized and divided by the maximum

number of points (Option Always multiplied by the number of respondents). Example: ten respondents answered the question thus the maximum number of points is 40 (10 respondents x 4 point for Always). The structure of the answers is:

- Three selected Always x 4 points = 12 points;
- Three selected Often x 3 points = 9 points;
- One selected Sometimes x 2 points = 2 points;
- Two selected Never x 1 point = 2 points.

Thus, the calculation is 12 (for Always) + 9 (for Often) + 2 (for Sometimes) = 23 points. 23 points from maximum 40 is 57.5%. Thus 57.5% of the appropriate cell will be colored.

On the other hand, regarding the answer option Never the calculation is: number of respondents that selected the Never option divided by the total number of respondents. Example: two respondents that selected Never divided by a total of ten respondents is 20%. Thus 20% of the appropriate cell on the map will be colored.

The same logic is applied to the questions with the options All, Majority, Minority and None. None is calculated as Never is calculated.

Level of agreement questions: The options contribute to different cells. One to the cell that contains state about which the respondents agree and, other to the cell that contains state about which the respondents disagree. The Neutral option contributes to both cells. For the answer options Strongly agree, Agree and Neutral (positive) the calculation is: the number of respondents per option is multiplied by the answer option weight, they are summarized and divided by the maximum number of points (Option Strongly agree multiplied by the number of respondents). One the other hand, for the answer options Neutral (negative), Disagree, Strongly disagree that contribute to other cell for the same entity on the same map, the calculation is: the number of respondents per option is multiplied by the answer option weight, they are summarized and divided by the maximum number of points (Option Strongly disagree multiplied by the number of respondents).

Example: ten respondents answered the question thus, the maximum number of points is 40 (10 respondents x 4 point for Strongly agree) i.e. -40 (10 respondents x 4 point for Strongly disagree). The structure of the answers is:

- One selected Strongly agree x 2 points = 2 points;
- Two selected Agree x 1 points = 2 points;

- Two selected Neutral x 0.5/-0.5 points = 1/ -1 point;
- Three selected Disagree x -1 point = -3 points;
- Two selected Strongly disagree x -2 points = -4 points.

Thus the calculation is 2 (for Strongly agree) + 2 (for Agree) + 1 (for Neutral) = 5 points. 5 points from maximum 20 is 25%. Thus, 25% of the appropriate cell will be colored. On the other hand, the cell that contains the state with which the respondents do not agree will be colored as a result of the following calculation: -1 (for Neutral) + (-3) (for Disagree) + (-4) (for Strongly disagree) = -8 points. -8 points from maximum -20 is 40%. Thus, 40% of the appropriate cell will be coloured.

Sliding questions: the calculation of this type of question is: the number of respondents per option is multiplied by the weight values for each characteristic. Then, the sum for each characteristic is divided by the maximum number of points (100 multiplied by the number of respondents). Example: the structure of the answers by ten respondents is given in Table 37.

Number of respondents	Number of respondents x weight	Number of respondents x weight
Two for Option 1	2x100=200	2x0=0
Three for Option 2	3x75=225	3x25=75
Four for Option 3	4x50=200	4x50=200
One for Option 4	1x25=25	1x75=75
Total	650	350
Maximum Value	10x100=1000	10x100=1000
Presence of state	650x100/1000=65%	350x100/1000=35%

Table 37: Calculation for sliding questions

Yes/ No questions: If the answer is “yes” then then one cell is filled in, if “no” then other cell for the same entity on the same map is filled in. The calculation is a number of selected answers (yes or no) divided by the number of total respondents. Example: ten respondents answered the question, four choose yes and six choose not. The result is that 40% of one cell and 60% of other cell will be filled.

Check-in questions: Regarding the first type of check-in questions (selected/not selected) the

same logic as for yes/no questions is applied. If checked-in means “yes”, if not it means “no”. Regarding the other type, the calculation for populating one cell includes the values of Level 3 and Level 2. The calculation is a sum of the results for Level 3 and 2 divided by the maximum value (number of respondents multiplied by the weight value for Level 3). On the other hand, the calculation for level 1 is a number of respondents that selected level 1 answer divided by the number of total respondents for that question. Example: ten respondents answered the question, the structure of the answers is:

- 3 selected Level 3;
- 4 selected Level 2;
- 3 selected Level 1.

Thus, the calculation for the first cell is 3x2+4x1=10. 10 divided by a maximum value of 20 is 50%. 50% of the cell will be colored. For the second cell the calculation is 3x1=3. 3 divided by 10 is 30%. Thus, 30% of the second cell will be colored.

6.3.3 Alignment

The alignment section, based on the maps in the atlas, provides a comparison between the states of different entities and different facets. In this way, for example, we can see how the entity ‘individual’ and ‘team’ are aligned on learning, vision and technology facets (Figure 41). The visual display shows strong misalignment between the entities ‘individual’ and ‘team’. By using filters, the number of entities and facets that will be included in alignment section can be dynamically adjusted. Also, by using different colors for the entities the alignment can be more easily identified.

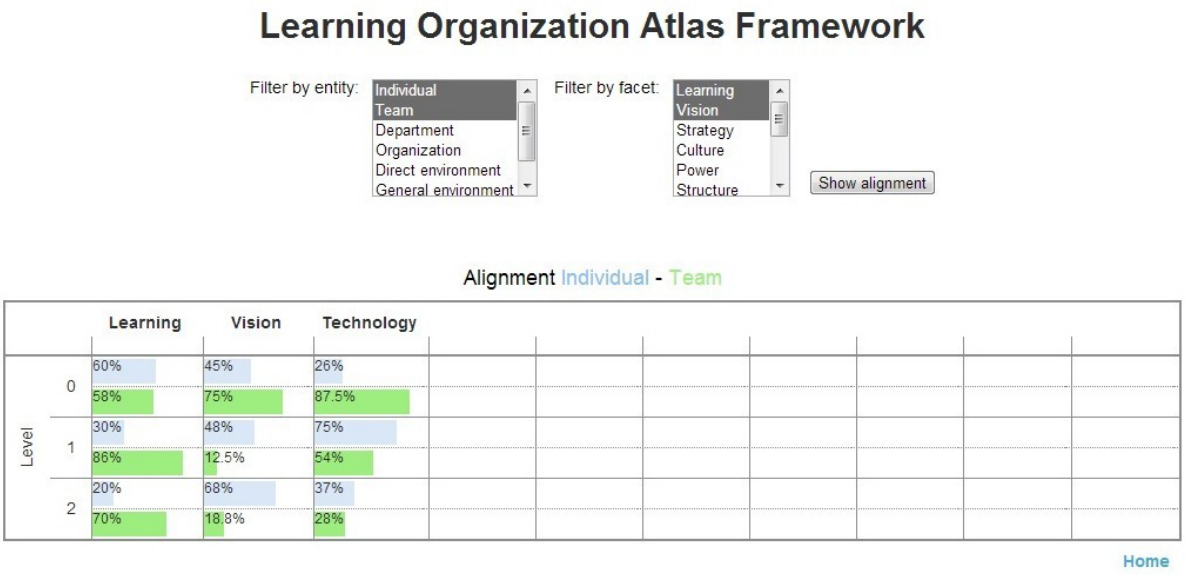

Figure 41. Alignment of two entities on two facets

6.3.4 Roadmap

The roadmap provides guidelines on strategies and actions that the organization can use in order to move from one level to another level for entity and facet. The front end of the roadmap provides an opportunity to the user to filter the strategies through a combination of the intentions, levels, entities and maps (Figure 42).

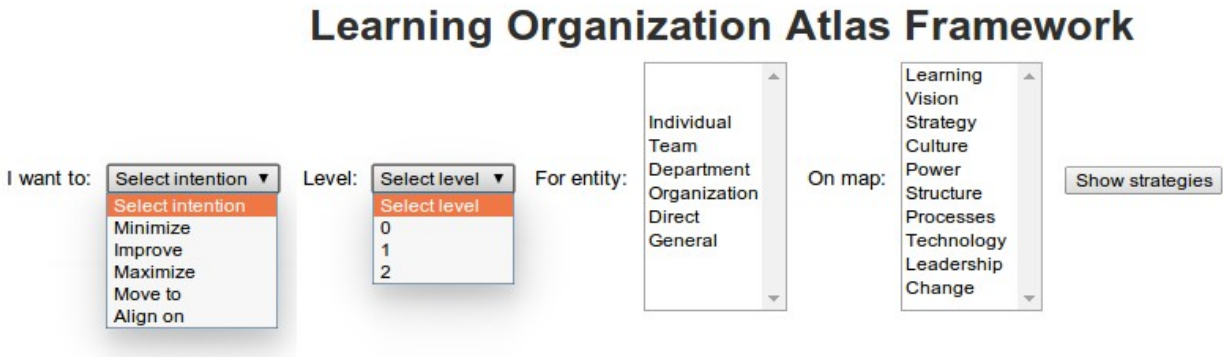

Figure 42: Roadmap front end

Based on the user's selections the appropriate activities will be displayed. To achieve this, a repository of activities is developed, rules for filtering and rules for activities selection.

6.3.4.1 Repository of strategies

The repository contains activities that were extracted from the following books:

- The Fifth Dimension Field Book: Strategies And Tools For Building A Learning Organisation;
- The Learning Company: A Strategy for Sustainable Development [Pedler et al., 1991];
- The Global Learning Organization: Gaining Competitive Advantage Through Continuous Learning [Marquardt and Reynolds, 1994].

The extracted activities were then indexed. However, before the activities are indexed it is needed to index all the maps' cells because the index will consist of the index of the cell that is the starting point, and the index of the cell that is the ending point.

Regarding the indexing of the maps cells, each map has 18 cells, in total for all ten maps 180 cells. Each cell index consists of the following elements:

- Facet index – consisting of the first and last letter of the facet name. For example: index for Learning facet is LG and for Structure facet is SE;
- Entity index – Each entity is assigned a number as their index in the following order: number 1 for individual, number 2 for team, number 3 for department, number 4 for organization, number 5 for direct environment, number 6 for general environment;
- Level index – the index of the levels is the number that determines their position. For number 0 for Level 0, number 1 for Level 1 and number 2 for Level 2.

The result is that the index for cell on the learning facet that represents an individual on level 0 is: LG10.

The activity index will consist of the index of the cell that is the starting point, and the index of the cell that is the ending point. Thus, the index of the activity for learning facet for individual to move from level 0 to level 1 is LG10/11.

6.3.4.2 Rules for filtering

The rules for filtering determine the logic and options for selecting on the front end of the roadmap:

Rule 1. Intention selection is always excluding. Only one intention can be selected.

Rule 2. When s/he selects “Minimize” s/he can choose only “Level 0”. The other Level options can not be selected. S/he can make multiple selection for the “For entity” and “On map”. At least one from each must be selected.

Rule 3. When s/he selects “Improve” s/he can choose only “Level 1”. The other Level options cannot be selected. S/he can make multiple selection for the “For entity” and “On map”. At least one from each must be selected.

Rule 4. When s/he selects “Maximize” s/he can choose only “Level 2”. The other Level options cannot be selected. S/he can make multiple selection for the “For entity” and “On map”. At least one from each must be selected.

Rule 5. When s/he selects “Move to” s/he can choose only one level from the “Level 1” and “Level 2”. “Level 0” cannot be chosen. S/he can make multiple selections for the “For entity” and “On map”. At least one from each must be selected.

Rule 6. When s/he selects “Align on” s/he can choose only one level from the “Level 1” and “Level 2”. “Level 0” cannot be chosen. S/he can make multiple selections for the “For entity” and “On map”. At least one from each must be selected.

6.3.4.3 Rules for activity selections

These rules determine which activities will be shown based on the selection the user makes.

Activity Selection Rule 1 for Filtering Rule. There is no Activity Selection Rule for this Filtering Rule

Activity Selection Rule 2 for Filtering Rule 2. The activities that have the appropriate indexing will be displayed. The appropriate indexing for activities is the one that minimizes the learning level 0 state. The indexing, for example, for an individual for learning map is LG10/10.

Activity Selection Rule 3 for Filtering Rule 3. The activities that have the appropriate indexing will be displayed. The appropriate indexing for activities is the one that improves the level 1 state. The indexing, for example, for an individual for learning map is LG11/11

Activity Selection Rule 4 for Filtering Rule 4. The activities that have the appropriate indexing will be displayed. The appropriate indexing for activities is the one that maximizes the level 2 state. The indexing, for example, for an individual for learning map is LG12/12.

Activity Selection Rule 5 for Filtering Rule 5. The activities that have the appropriate indexing will be displayed. The appropriate indexing for activities is the one that moves from learning level 0 to learning level 1, or from learning level 1 to learning level 2 state. The indexing, for example for, individual for learning map is LG10/11 or LG11/12. However, in order to be able to move from one learning level to the next one, sometimes there is a need to first minimize the presence of state at learning level 0 (thus the Activity Selection Rule 2 for Filtering Rule 2 is applied) or improve state (thus the Activity Selection Rule 3 for Filtering Rule 3 is applied) in order to move to the next learning level. In order to make sure, when we first display the Activity Selection Rule 2 for Filtering Rule 2 and Activity Selection Rule 3 for Filtering Rule 3, we use the following indicators:

- Indicators for minimize state. If the state is minor (less than 25% state presence) then do not invoke strategies for Strategy Selection Rule 2 for Filtering Rule 2. If state is average or maximum (more than 25% state presence) then invoke strategies for Strategy Selection Rule 2 for Filtering Rule 2.
- Indicators for improve state. If the state is major (more then 75%) then do not invoke strategies for Strategy Selection Rule 3 for Filtering Rule 3. If state is minor or average (less than 75% state presence) then invoke strategies for Strategy Selection Rule 3 for Filtering Rule 3.

Strategy Selection Rule 6 for Filtering Rule 6. The selection of the strategies for this rule is done backwards. Meaning, first, a check is performed to see is there a need to move from one level to another level. If this is the case, we apply Strategy Selection Rule 5 for Filtering Rule 5 for those cells where there is a need to move. For the others, where there is no need to move, we apply Strategy Selection Rules 2, 3 and 4.

6.4 Guidelines for using the tool

Creating a company. A company shows an interest to use the atlas framework. The administrator creates a new company in the system. The new company is assigned a company code, company name, and company's departments. The company code is send to the respective company.

Visiting the web site. The company distributes the framework's web link and company code to its employees. When the employees enter the domain www.atlasframework.info in their browser they are taken to the first page of the framework. The prototype is now optimized only for Google Chrome and this browser should be used. On the first page, the employees have an option to choose which part of the framework to use. If the questionnaires are answered, then also the atlas and the roadmap can be seen, otherwise the respondent starts with Identify section.

Answering questionnaires. The first page of the Identify section requires the visitor to enter the company code, department and position. Through the position option, the stakeholder lens (employee, manager and executive) is introduced in the system. When all the information is entered, the questionnaires for each facet are presented (Figure 43). The questions in the questionnaires are structured and developed in such a way, to evaluate the presence of facet attributes per entity (ecological lens) and per level (developmental lens).

Generating atlas. When at least one questionnaire is answered, the atlas can be generated. The Atlas section is reached through the first page by clicking on the Atlas section. To generate the atlas the company code should be entered. Then, the maps for all the facets are presented. The maps can be drilled down to show more specific maps for department and for position. Each map is divided into cells. Each cell is an intersection of an ecological and developmental lens. The more populated the cell is, the respective entity has stronger presence on the state for the learning level.

Alignment. By clicking on the Alignment section on the first page, the Alignment page is displayed. After entering the company code, the user is able to filter by entity and by facet. The selection is not excluding, and the user can select at least one entity and facet to maximum all entities and facets. Based on the selection, an alignment map is presented.

Roadmap. The administrator is given an option to select the to-be state of her/his organization per facet and entity. Then, a list of strategies is displayed and the administrator can explore the description of the strategies and the actions they require.

6.5 Conclusion

In this chapter, I have presented the Learning Organization Atlas Framework web tool. The tool as instantiation of the Learning Organization Atlas Framework concept. The tool includes features, structure and relations that go above the current tools: the Dimensions of the Learning Organization Questionnaire (DLOQ) available at www.partnersforlearning.com/instructions.html and the Learning organization survey (LOS) available at http://los.hbs.edu. In Table 38, a comparative overview of those three tools is presented. On a practical level, our web tool provides functionalities that meet the challenges identified at the beginning of this thesis. It is possible to include a large number of facets, their attributes and values. Through indexing questionnaires and appropriate formulas, the patterns of relationships are developed. Also, through dynamic creation of alignment, the organization is aware not only of the development in certain facets, but also how that development is aligned. Finally, the visual maps-like display improves the presentation of the results and their understanding. It can be concluded that the

prototype is a practical, operational tool that the managers can use.

	DLOQ	LOS	LOAF web tool
Focus of the tool	only evaluate	evaluate and benchmark	evaluate, compare, analyze and design
Number of entities involved in the tool	three (individual, team, organization)	one (unit)	Six (individual, team, department, organization, direct environment, general environment)
Type of questions	one (likert)	one (likert)	multiple (likert, sum up, yes/no, sliding)
Visual display	poor	medium	good
Option to drill down	no	no	yes
Option to create different outputs	no	no	yes (through filters)
Guidelines for development	no	no	yes

Table 38. Comparative overview of three tools

Chapter 7

Application of the LOAF Web Tool

Avi: Tony.
Bullet Tooth Tony: What?
Avi: Look in the dog.
Bullet Tooth Tony: (What) You mean, "look in the dog"?
Avi: I mean, open him up.
Bullet Tooth Tony: It's not as if it's tin of baked beans! What d'you mean, "open him up"?!
Avi: You know what I mean.

Movie “Snatch” [Ritchie, 2001]

7.1 Objective

The basic questions about the artifact are, first, how well it works and second, have we made any progress [March and Smith, 1995]? The objective of this chapter is to give an answer to these two questions. This chapter presents the results of six case studies investigating the application of the Learning Organization Atlas Framework Web Tool in six different companies. Based on the guidelines for case study research [Yin, 2009] the case studies evaluate the application of the Learning Organization Atlas Framework Web Tool in two steps. First, a pilot case study was performed. This case was purposefully selected and the main criteria was that this company is recognized in the country as innovative company. Through the pilot case study both substantive and methodological issues were covered. The results are explicit description of the lessons learned for both research design and field procedures (section 7.2.). Then, through a process of screening that included collecting documentation about each candidate and queering people knowledgeable about each candidate ten other companies were invited to participate in the application of the framework. Five of them accepted the invitation. Finally, the methodological evaluation of the case study research design is performed through four tests: construct validity, internal validity, external validity and reliability. In the conclusion the reflection about the case studies and the feedback on the framework is presented.

7.2 Pilot case study

The pilot case study assumed the role of a “laboratory” through which the conceptualizations and the framework can be evaluated and improved. The company for the pilot case study was selected for several reasons: first, previous research has recognized this company as innovative [Santa and Kekenovski, 2013]; second, the company was open for cooperation and ready to include personnel from different positions in the research; and third, the communication was made easy due to prior personal contact with the company's management. The pilot study was done prior the specification of the final data collection method and prior the final articulation of the framework structure and propositions. Thus the pilot case study provided considerable insight in the issues being studied.

The company is small and medium sized enterprise with expertise in three technology areas: motion control and process automation, specialized software development and composites production expertise. It was identified as one of the top three companies in the world [Santa and Kekenovski, 2013]. It has strong export orientation and more then 95% its sales are export. The company has more than 90 employees with strong R&D department. It provides complete

solutions (design, manufacturing and servicing) for its customers and it has capabilities to install and support its customers everywhere in the world. Finally, the company's management puts strong emphasis on learning and development of new solutions.

After developing the first version of the Learning Organization Atlas Framework, an interview was performed with the employees the company. A group interview was done with one executive, two managers and two employees from the company. However, having an interview with practitioners on the learning organization atlas framework is to a certain extent problematic, because the framework is a theoretical construct that cannot be directly evaluated by the practitioners. To a certain account, this was overcame through a detail graphical and verbal presentation of the framework.

The interview was structured in three parts: first, presentation and explanation of the Learning Organization Atlas Framework; second, group interactive practical testing of the Learning Organization Atlas Framework; and third, group interview with the participants. The goal of the third part was to gain feedback from the participants regarding how the framework can be improved.

The results of the pilot testing of the framework are:

- Add more entities. The first version of the framework had the individual, team and organization as entities. However, during the discussion, it was identified that in the same organization different departments have different predispositions and act differently. For example, the accounting and research and development department. Thus, this should be represented in the framework. Furthermore, according to one of the participants “it is not the same to be a learning organization in Macedonia and in Finland”. Both countries have different business environments and different surroundings. The influence is that “you need to put much more effort to be a learning organization in Macedonia than in Finland”. As a result the Direct and General environment were included as entities in the Framework;
- Eliminate the meta level. During the group interview there were discussion about the need of the meta level and its presence in a company. This, combined with the identification in the literature that meta level learning is rarely present, the goal to make the framework practically relevant, a decision was made to eliminate the meta level from the framework;
- Change the input in the maps. During the practical testing each participant received a map from each facet. Under each map there was an explanation for each cell on the map. However, during the group interview the comments that I received were that they could

not at all times correctly position themselves on the map. The reason was that at the same time they could be, for example, on level 1 and 2. Thus, it was not their position on the map that should be identified, but their distribution of presence on the map. To meet this challenge, for each map a questionnaire was developed. The answers of the questions will enable correct distribution of presence on the map.

Paralleling the pilot case study with additional literature review ensured that the research reflected the significant theoretical issues and the contemporary empirical experiences. The result is finalisation of the Learning Organization Atlas Framework. That final version was used for the next case studies.

7.3 Company A

Company A is a multinational IT company with main operations in Macedonia. The company has over 500 employees worldwide, from which around 350 in Macedonia. Its main business is provision of outsourcing services to telecommunication and other companies. As a result large majority of its customers are outside of Macedonia. However the company is also investing in development of its own products. To achieve this they have established research and development center in Macedonia that employs the most innovative and advance employees of the company. In their headquarters in Macedonia a research session was performed with the company's employees. Five persons responded to the questionnaire: one executive, two managers and two employees. In the beginning I gave a short explanation about the framework and the questionnaire. I was also present during the answering session and, if some of the respondents asked a question I provided an explanation. The respondents answered paper-based questionnaires that were later on added in the web tool. Based on the questionnaires three outputs are available in the web tool:

- maps per facet. Each of these maps can be drilled down to a position and departments;
- alignment of the maps. Each alignment can be customized for map and entity;
- roadmaps. Each roadmap can be narrowed or expanded depending on the interest of the respondent.

7.3.1 Atlas

In total, ten maps are created for Company A. All the maps can be seen in the web tool. Presentation of all the maps will take a lot of space, thus, here we will present and analyze three maps: learning, vision and technology.

The learning map (Figure 43) identifies that there is presence of transactional learning on an

individual level and that, overall, the focus is more on level 1 learning.

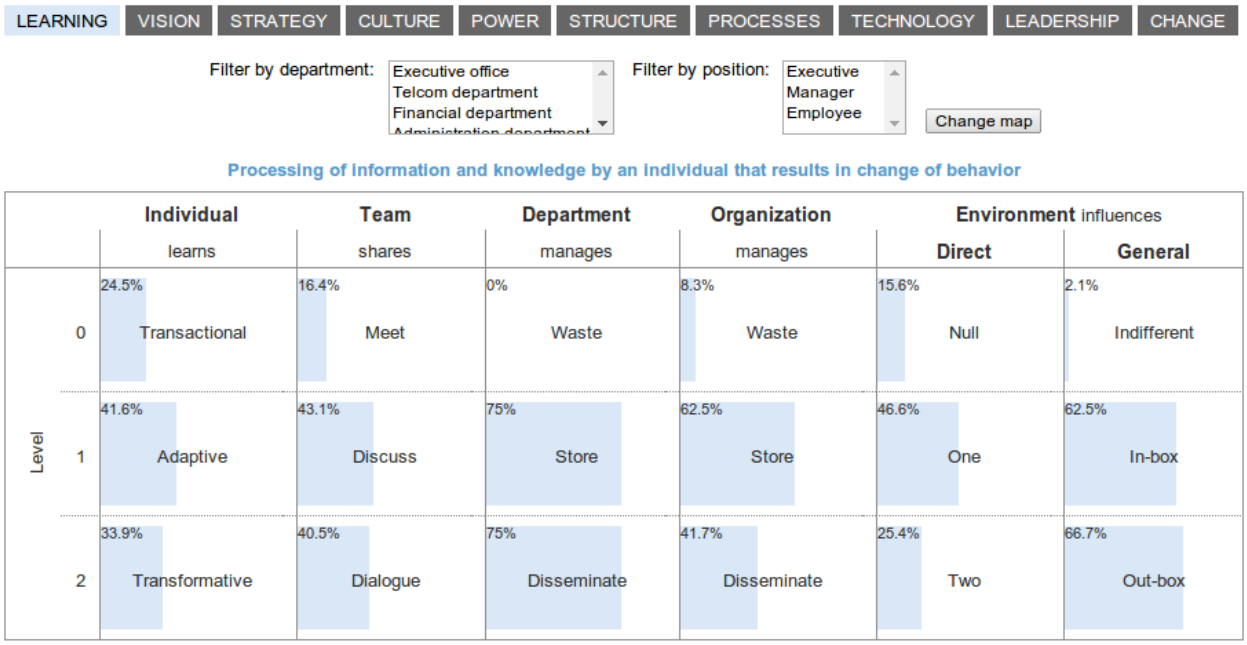

Figure 43: Company A Learning map

If we decompose the answers, for example, for Executive (Figure 44) and Employee (Figure 45) we can notice that the executive tends to perceive level two as more practised than what the employees perceive. This is also the case for the vision and technology map.

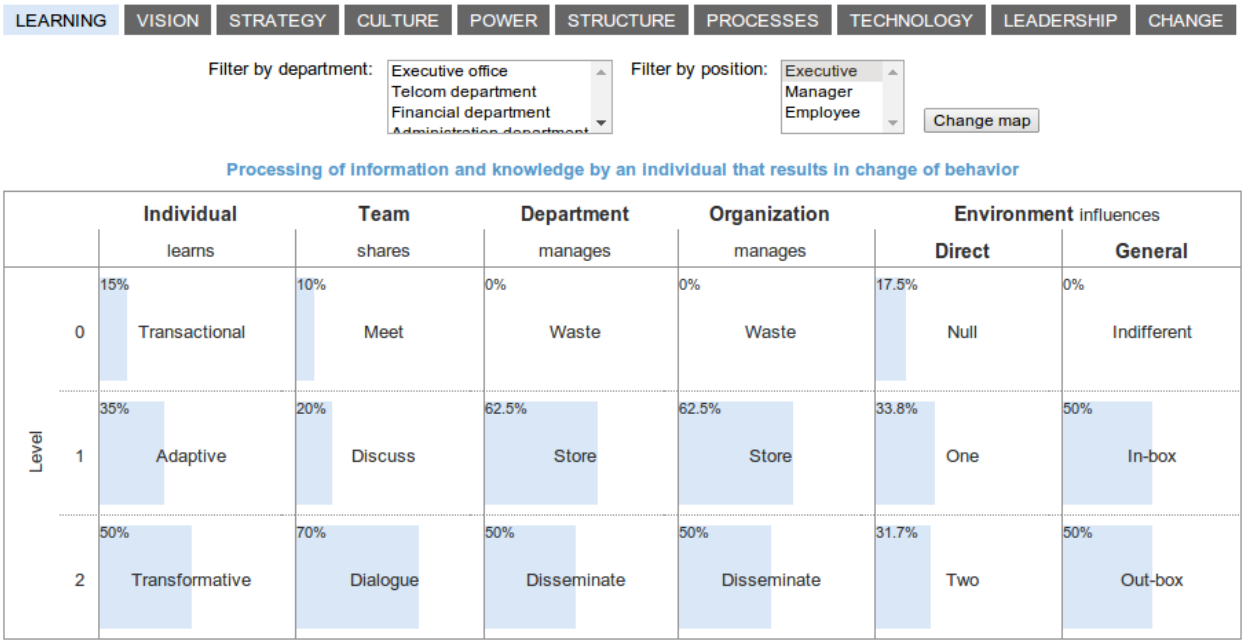

Figure 44: Company A Learning map Executive perspective

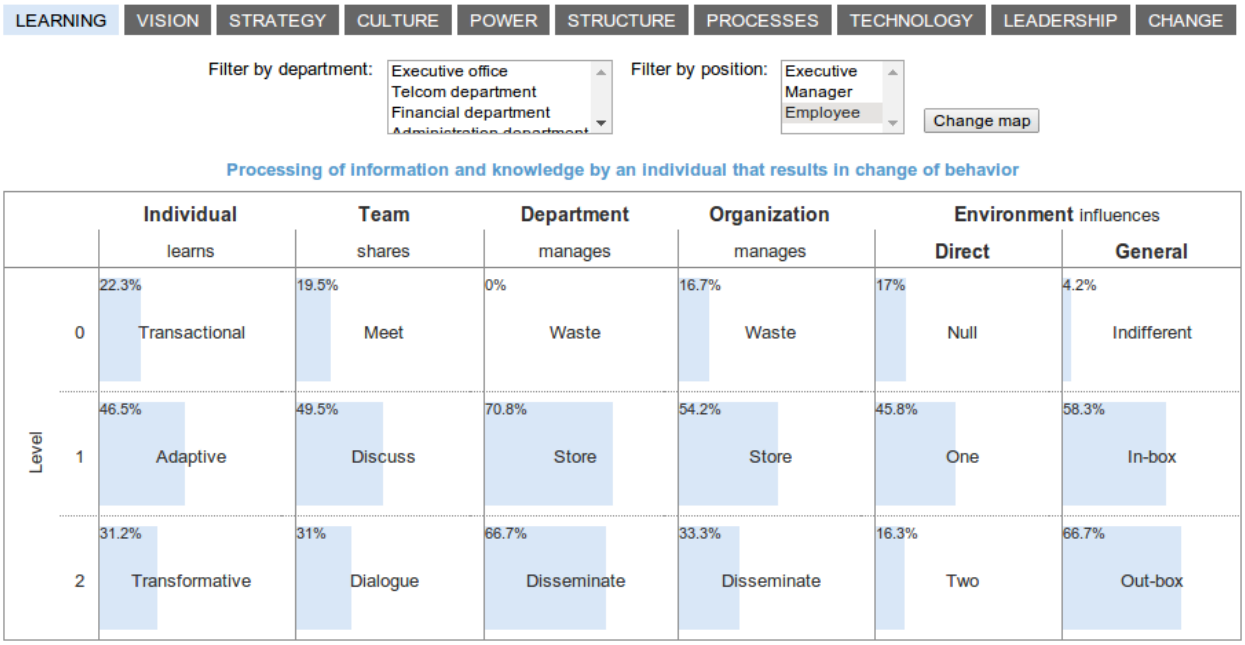

Figure 45: Company A Learning map employee perspective

7.3.2 Alignment

The alignment of all the entities on all the maps is presented in Figure 46.

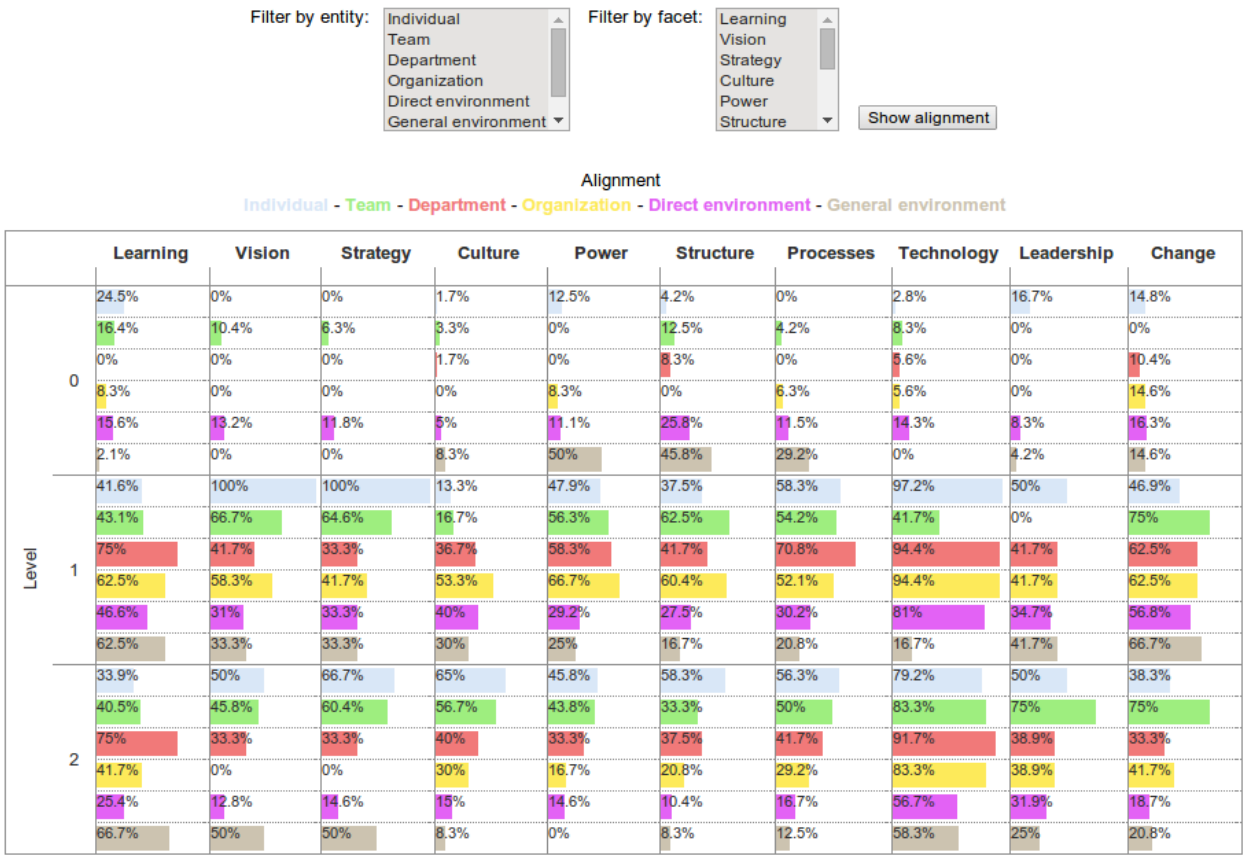

Figure 46: Company A Alignment map

The alignment summary map gives immediate overview to the situation in the company. For example, we can notice that individuals and teams have presence at level 0. Also, that there is no presence of the Entity Organization on Level 2 for Vision, Strategy, Culture and Strategy map. This means that all the respondents agree that not every member of the organization can participate in the development of the vision and the strategy of the organization. This could create a problem because, as proposed by Senge [1990], if there is a not clear shared direction, the learning organization cannot be established. Furthermore, there is a strong presence of Level 0 for the General environment on Power, Structure and Processes. This can create big problems for the organization, because it will mean that it will also need to change the General environment.

7.3.3 Roadmap

Based on the analysis of the alignment map Company A might need to achieve the following goals: a) move to level 2 for entity Organization on map Vision and Strategy; and b) move to Level 2 for entity Individual and Team on Learning map.

To achieve the first goal the company might do the following activities:

- Organize vision/ strategy meetings;
- introduce an on-line platform to communicate ideas for vision/ strategies;
- issue draft versions of the vision/ strategies to the interested employees.

On the other hand, to achieve the second objective for the entity Individual the company can do the following activities:

- start asking themselves questions: is this the right thing I am doing? Is this the goal that I need to achieve? What is beyond the current market and product that we can do? Are these processes the right processes?;
- Read more about transformative types of learning from the following books “On Organizational Learning” from Argyris (1999) and “The Fifth Discipline: The Art and Practice of the Learning Organization” from Peter Senge (1990).

For the team, it can perform the next two activities:

- During the team work create a number of proposed combinations of the ideas presented by different team members;
- visualize the combinations and play devil's advocate game in analyzing the proposed combinations.

7.4 Company B

Company B is Macedonian medium size company active in customization of open source software solutions and providing outsourcing services to foreign companies. Its main activities are in the area of customer relationship management software solutions. The company has around 90 employees and strong growth in the past three years. According the CEO, the company is steadily moving towards the state in which will offer its own products and services based on own research and development. As a result it will minimize it outsourcing services. Five persons responded to the questionnaire: one executive/ owner, two managers and two employees. One

manager answered the questionnaire after the questionnaire session and sent a scanned version of the answered questionnaire.

7.4.1 Atlas

For company B I will analyze the vision, strategy and power map. When we compare the vision (Figure 47) and the strategy map (Figure 48) we can notice two facts. First, nobody has participated in the development of the vision and, second, the creation of the vision is top down, it is not developed through a shared process. On the other hand, individuals feel that they can propose what the strategy could be, however, they all agree that the strategy is made top down. However, when you drill down on stakeholder level, what is noticeable is that the executive does not know the vision and says that the organization does not have a vision (Figure 49).

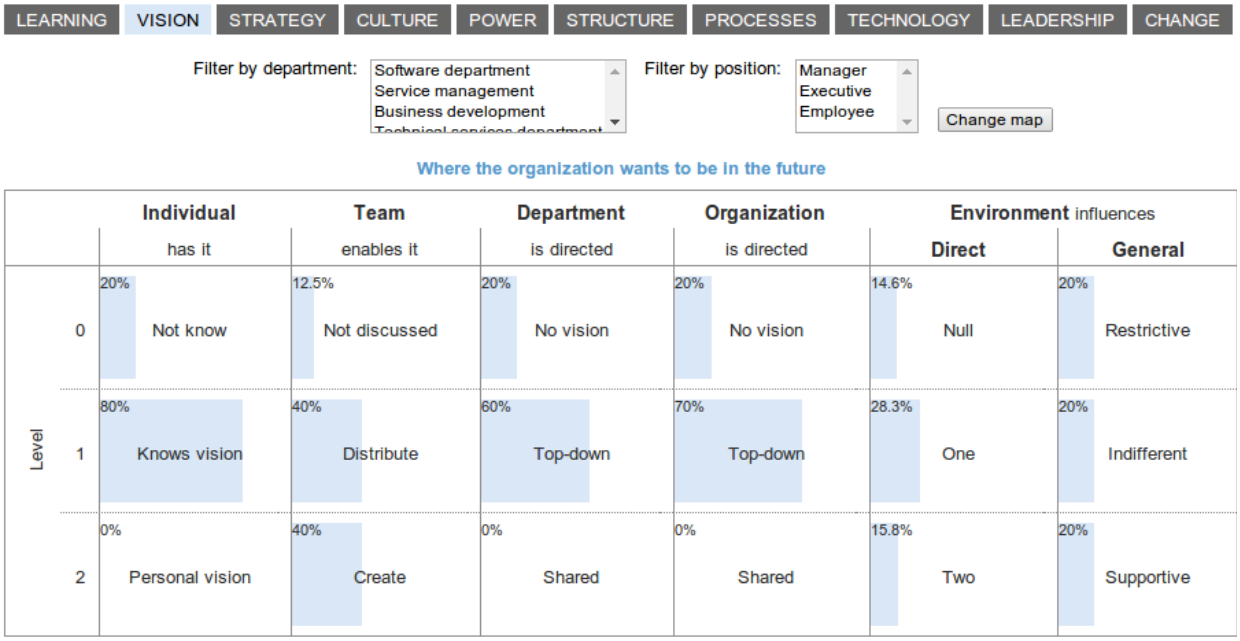

Figure 47: Company B Vision map

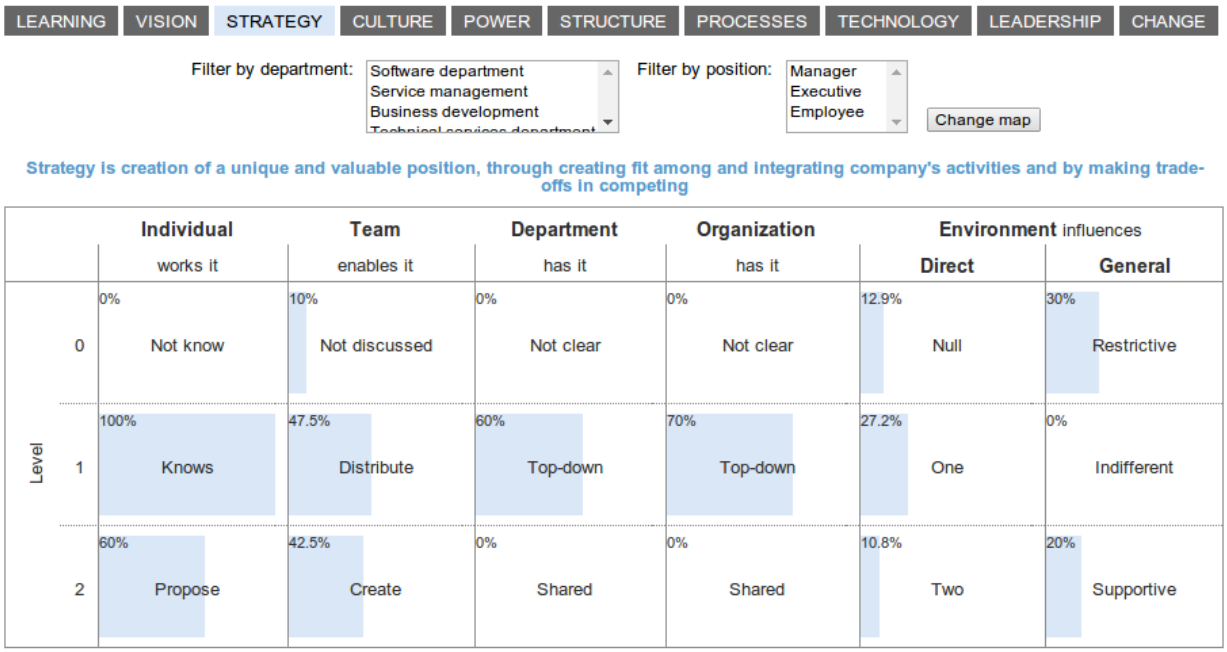

Figure 48: Company B Strategy map

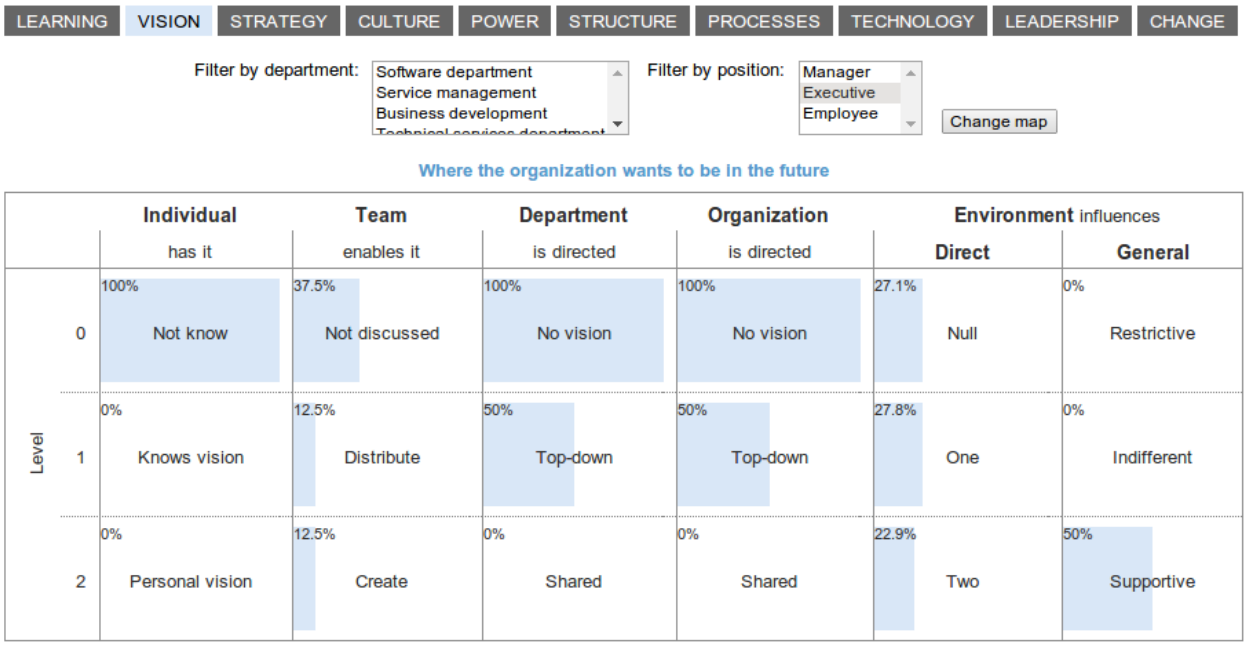

Figure 49: Company B Vision map executive perspective

This differentiation in the responses is actually a result of the lack of presence of level 3 on department and organization entity. Because the vision and the strategy are developed top down, this creates a situation where the employees make assumptions about what the vision and the strategy of the organization are and, based on that, they say that they know the vision/ strategy when there is no vision and strategy.

The power map (Figure 50) shows that there is a balanced empowerment of the individuals and the teams. However, the respondents consider the departments as a place where more bottom-up empowerment is present than in the organization. Thus we can say we have a learning department, but not a learning organization. Although, in the department and the organization, there is an average presence of state where the ones who have the power do not distribute it.

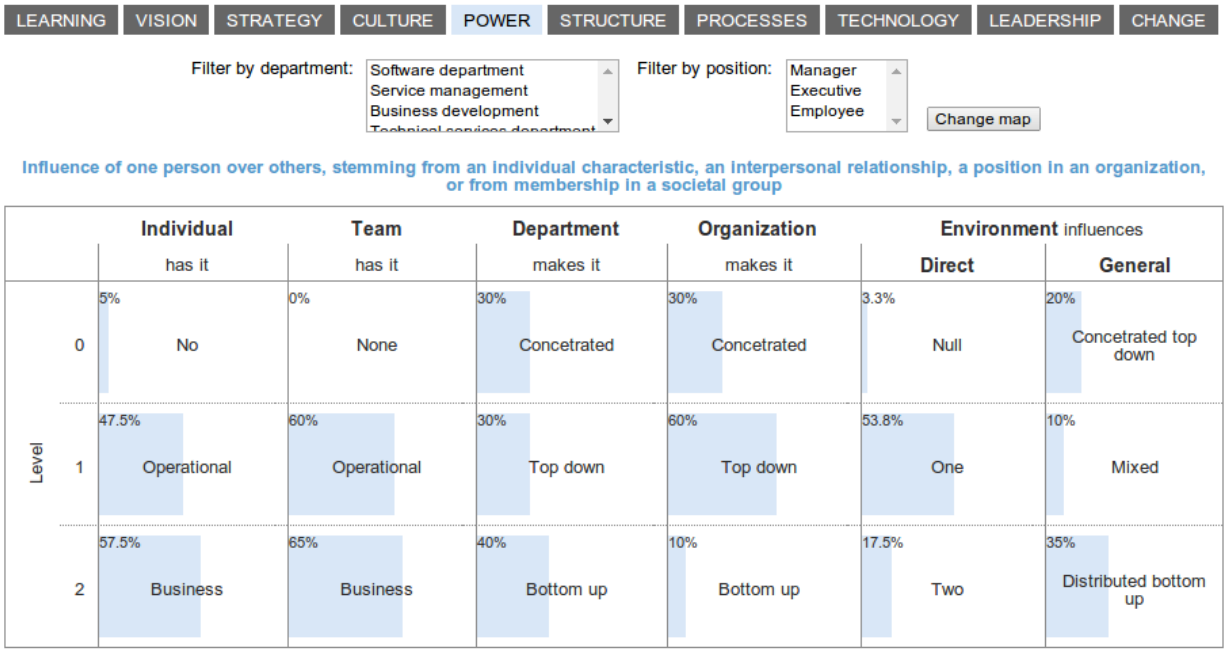

Figure 50: Company B Power map

7.4.2 Alignment

The alignment of company B is presented in Figure 51. Based on the figure, we can identify the vision, power and processes cells on departmental and organizational level as problematic. Furthermore, as problematic, we can identify presence of transactional learning on individual

level. Finally, for level 2 for the strategy, culture, power, structure, processes leadership we can identify decreasing trend of presence of level 2 as we move from individual towards organization entity. This could indicate that, although the individual and teams practice the characteristics of the learning organization, the departments and organization need to move to level 2 in order for us to have an aligned organization that will be able to fully use the benefits of the learning organization.

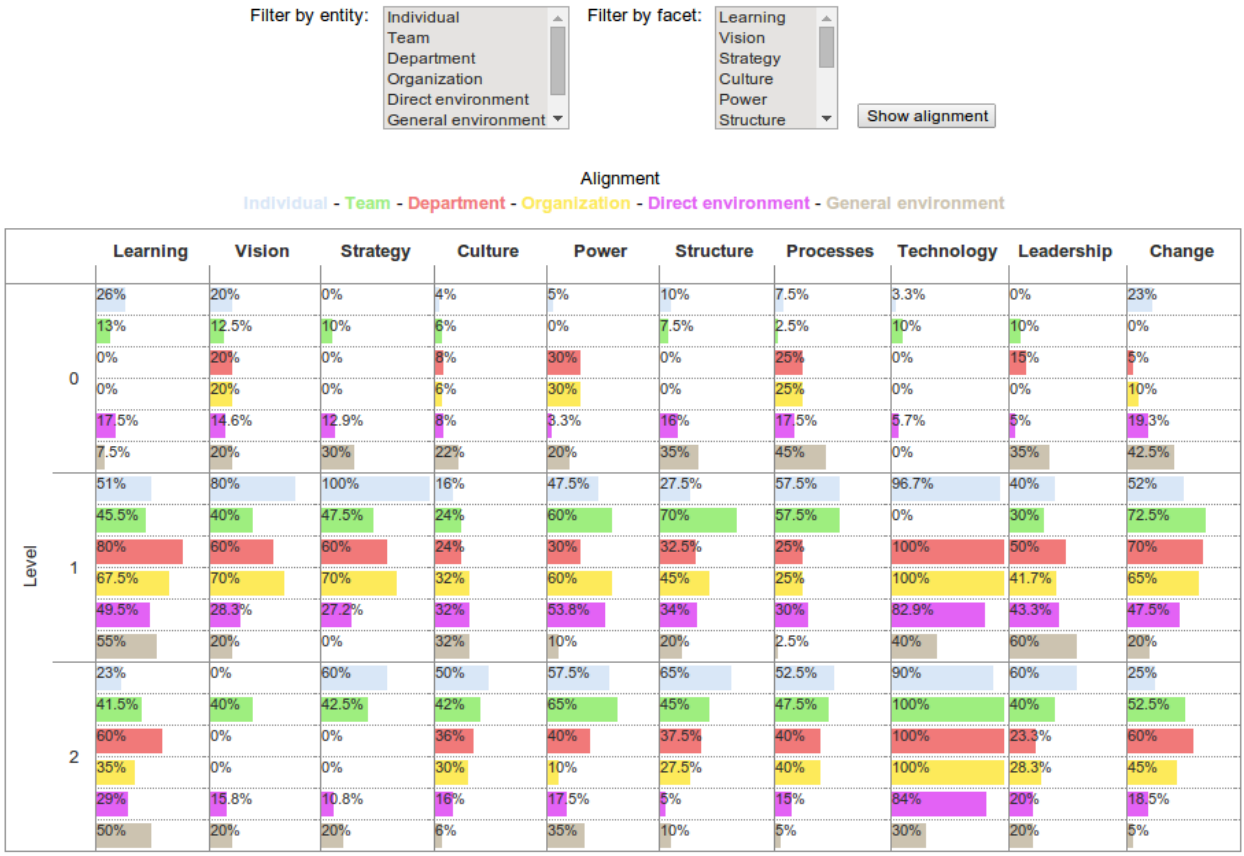

Figure 51: Company B Alignment map

7.4.3 Roadmap

For company B, based on the analysis, the goal: move to level 2 for entity Individual, Department and Organization on Vision map is identified. To achieve it, it can practice the following activities for Individual:

- share with the employees what is vision, why it is important for them to state their opinion

- templates where they can write their visions;
- assign a person from HR that will be able to explain the employees how they can draft their vision, and what elements it should have.

For the Department and Organization, can practice the following activities:

- Organize vision meetings;
- introduce an online platform to communicate ideas for vision;
- issue draft versions of the vision to the interested employees.

Also, a second goal is identified: minimize Level 0 for the entity Department and Organization on Power map. The proposed activities are:

- draft decision points that the managers are making now, but that can be transferred to the employees;
- organize empowerment/ responsibilities training;
- start top down empowerment programme;
- organize an empowerment programme.

7.5 Company C

Company C is a very small IT company from Macedonia established in the end of 2012. It provides outsourcing services to foreign companies, and it has its own solutions that it sell in Macedonia, and the region. The company at this moment is focused to attract more customers through which it will be able to invest further resources in the own solutions development. It employs eight people. Executive, manager and employee answered the questionnaires during a questionnaire session in company C premises.

7.5.1 Atlas

For company C the structure, leadership and change map will be analyzed. The structure map (Figure 52) shows that more or less all the entities are on level 1 and 2. Taking into account that this is a small recently established company, map like this can be expected. However, if we drill down the organization entity map we can notice that the manager (Figure 53) and the executive (Figure 54) have rather strong perspective on the organizational structure. The manager perceives the organizational structure as mainly not flexible, while the executive states that it has bounded flexibility. These different perceptions might create problems when the organizational structure

will need to be flexible in order to meet external challenges.

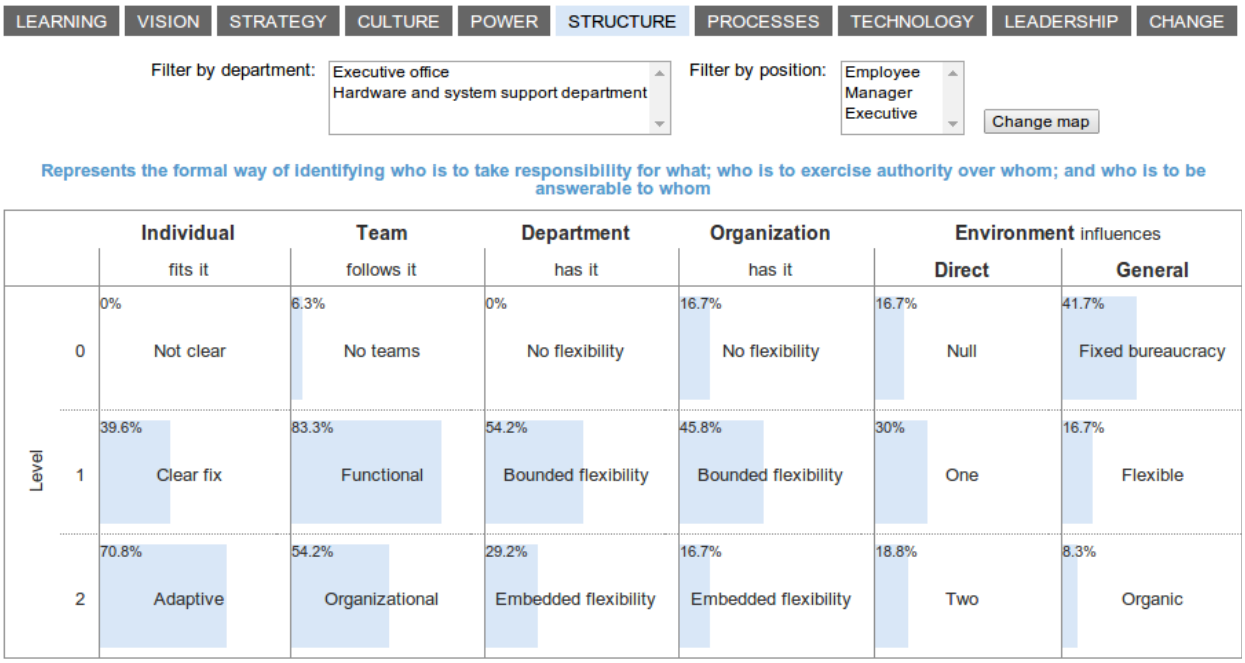

Figure 52: Company C Structure map

The leadership map (Figure 55) shows strong positioning of company C on level 1 with appropriate presence on level 2. However, based on the results from the structure map, if we drill down the leadership map from an employee perspective (Figure 56) we will notice that on leadership the employee positions the team, department and organization on Level 0. This, combined with the presence of level 1 state "leaders from top" in department and organization could undermine the role of the leaders in providing and facilitating the direction of the company.

On the other hand, there is consistency between the perspectives of employee, manager and executive on the change map. The change map (Figure 57) shows that the entities are positioned

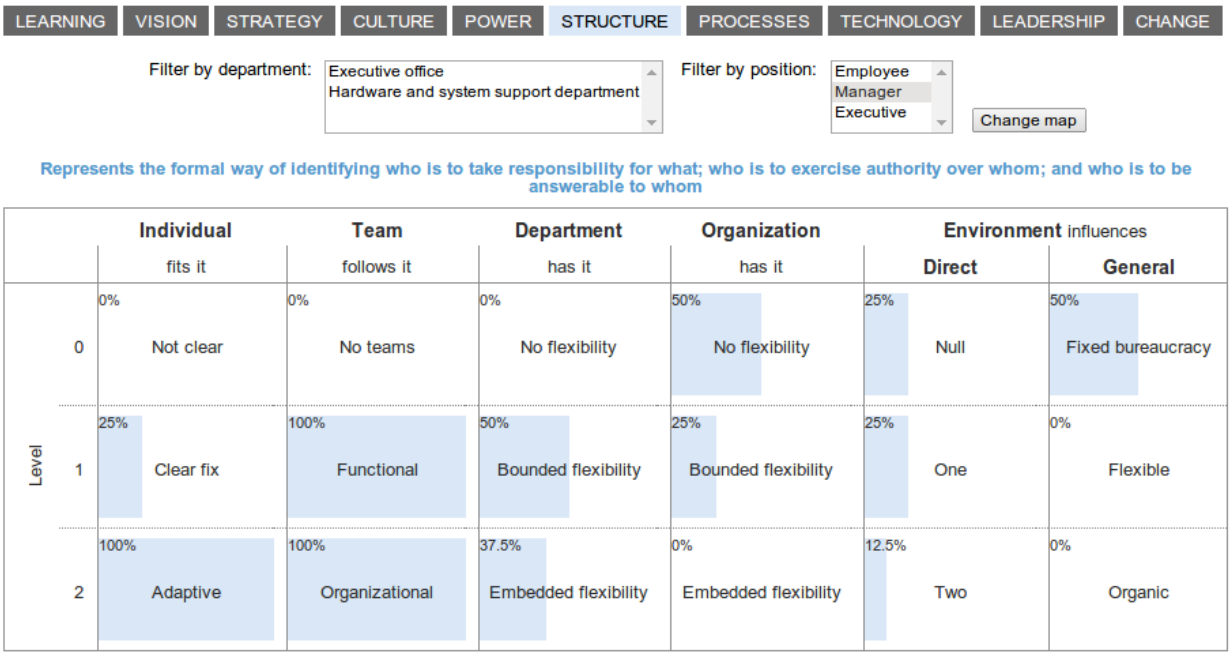

Figure 53: Company C Structure map manager perspective

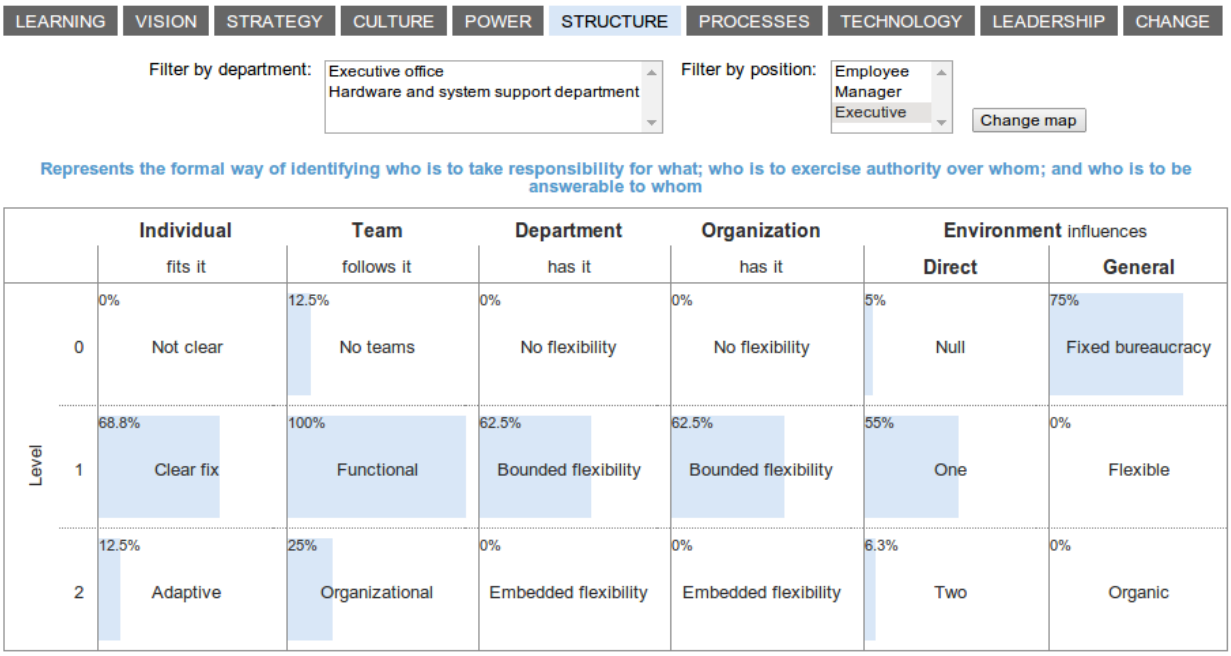

Figure 54: Company C Structure map executive perspective

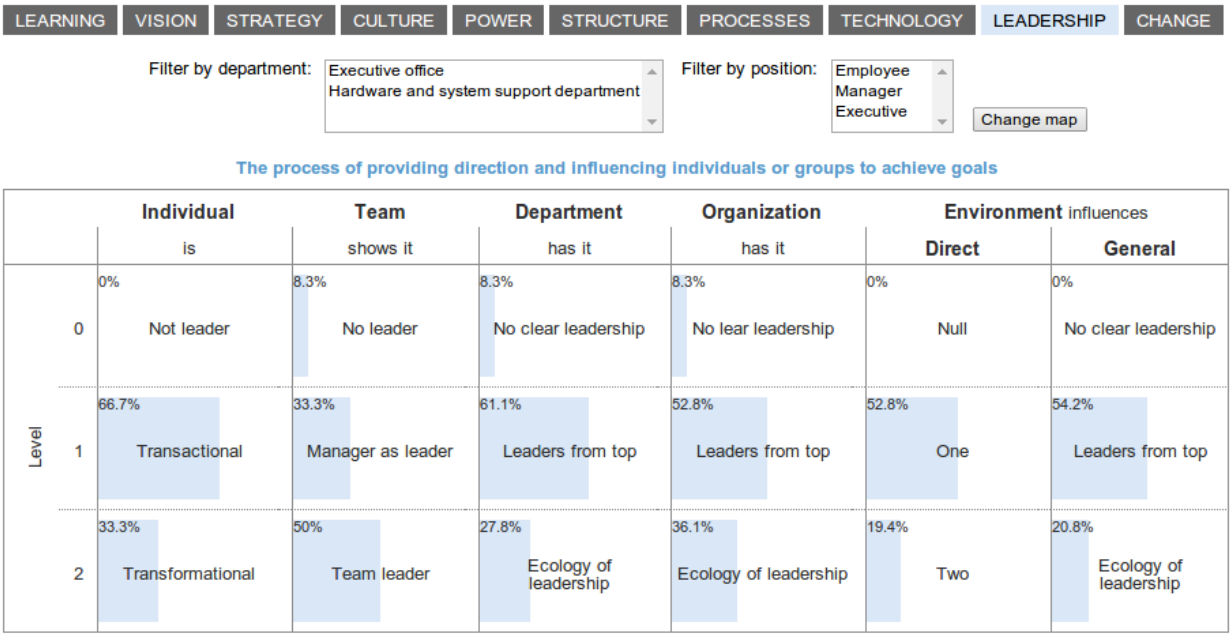

Figure 55: Company C Leadership map

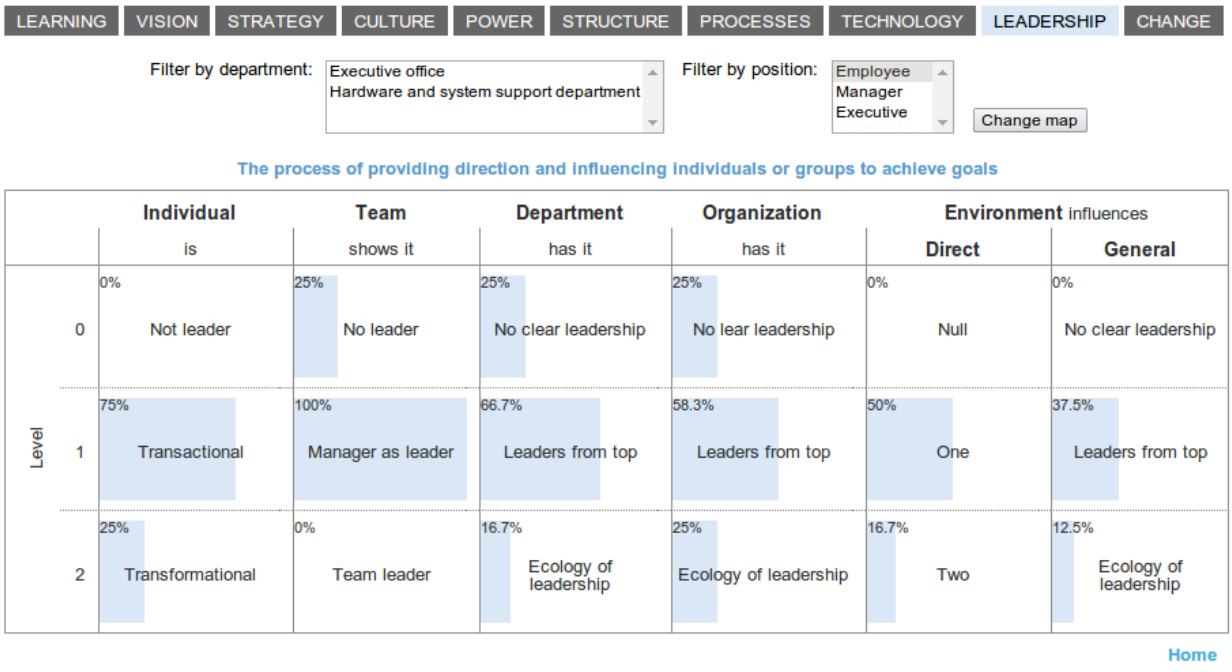

Figure 56: Company C Leadership map employee perspective

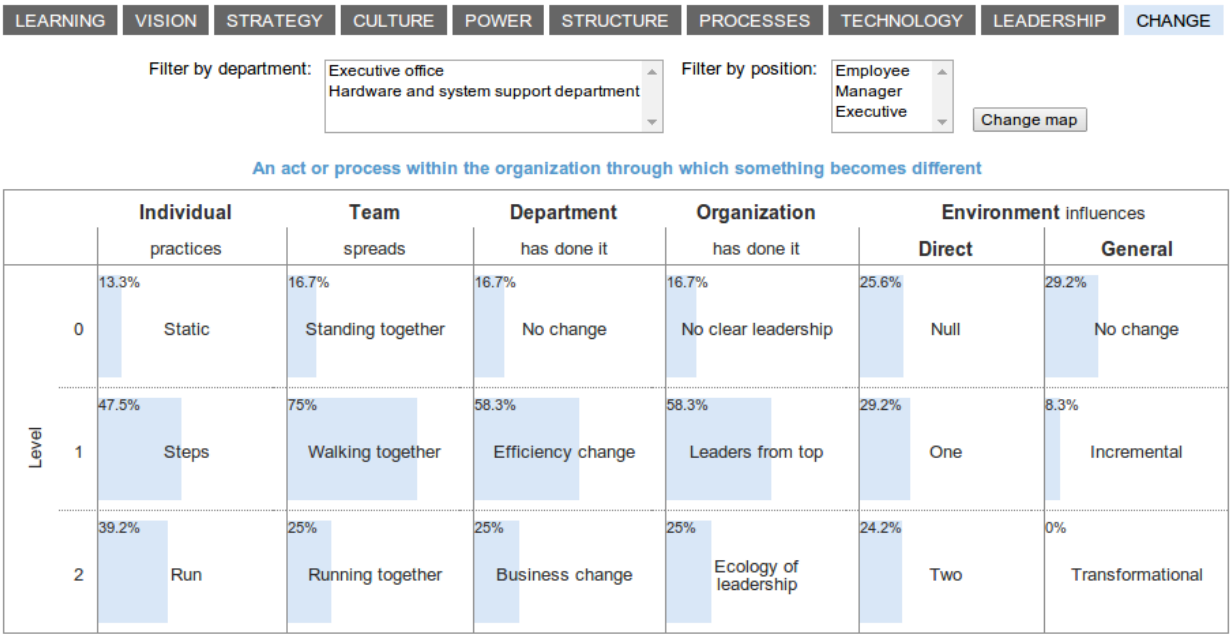

Figure 57: Company C Change map

at level 1. Thus, they tend to practice mainly efficiency oriented change.

7.5.2 Alignment

The alignment of company C is shown in Figure 58. What is noticeable is the presence of Level 0 for team on certain maps. Because of only three respondents, it will be needed to make further questionnaires in order to identify if this state is present because of only one respondent, or it is a shared perspective by more respondents. This alignment map shows one shortcoming of the atlas framework: if a small number of people answer the questionnaires, the generated maps might not show the real picture of the organization. This could be also the case for showing large presence of certain states.

7.5.3 Roadmap

For company C the goals that need to be achieved are for Leadership and Power map. The goal for the Leadership map is: move to Level 2 the entity Teams on the Leadership map. The proposed activities are:

- explain leadership roles and what the leaders are doing;
- open a process of different team members to lead different projects.

Regarding the power, the goal is: move to Level 2 for entity Organization on Power map. The proposed activity is:

- develop risk-free programme. This programme will identify the activities that are more or less risk free. For these activities the persons that are responsible for them will be able to make decisions about it and how to change it. The idea is the persons to have the start and end point and, to be able to make decisions on how to achieve them. There will be monitoring of the success of each employee. If it is a success, the employee will be able to move towards the next level: determining the end point.

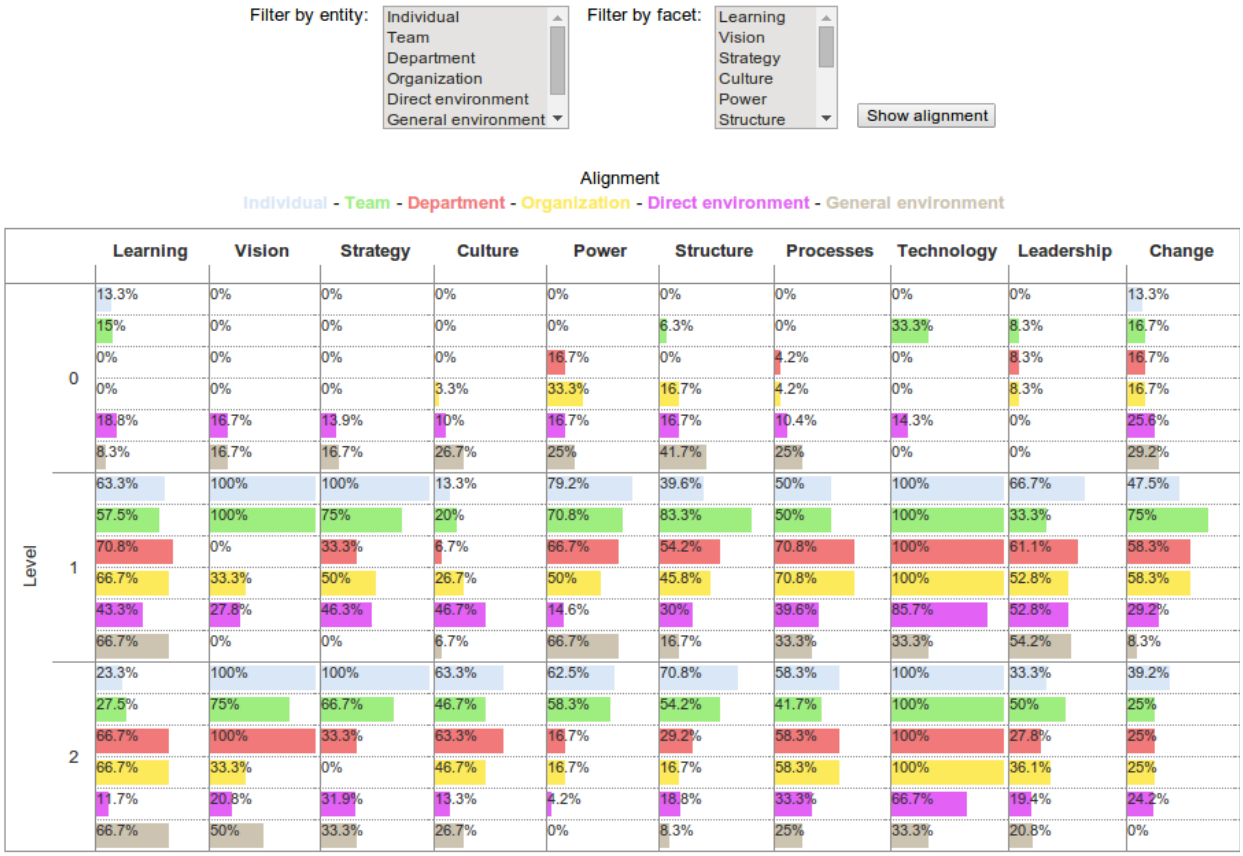

Figure 58: Company C Alignment map

7.6 Company D

Company D is a small IT company specialized in ERP software. It is part of a regional IT company. It operations are focused on sales, implementation and support of their ERP solution. Since it establishment in Macedonia the company had strong success in implementation of its solution in companies in Macedonia. The CEO puts emphasis on learning and tries to strengthen the capabilities of the employees in order the organization to remain flexible and adaptive. The questionnaires were answered by two executives and two employees. One executive answered the questionnaire in a separate session.

7.6.1 Atlas

Company D's learning, culture and process map from the atlas will be analyzed. The learning map (Figure 59) shows the perception of the respondent that the departments and the organization

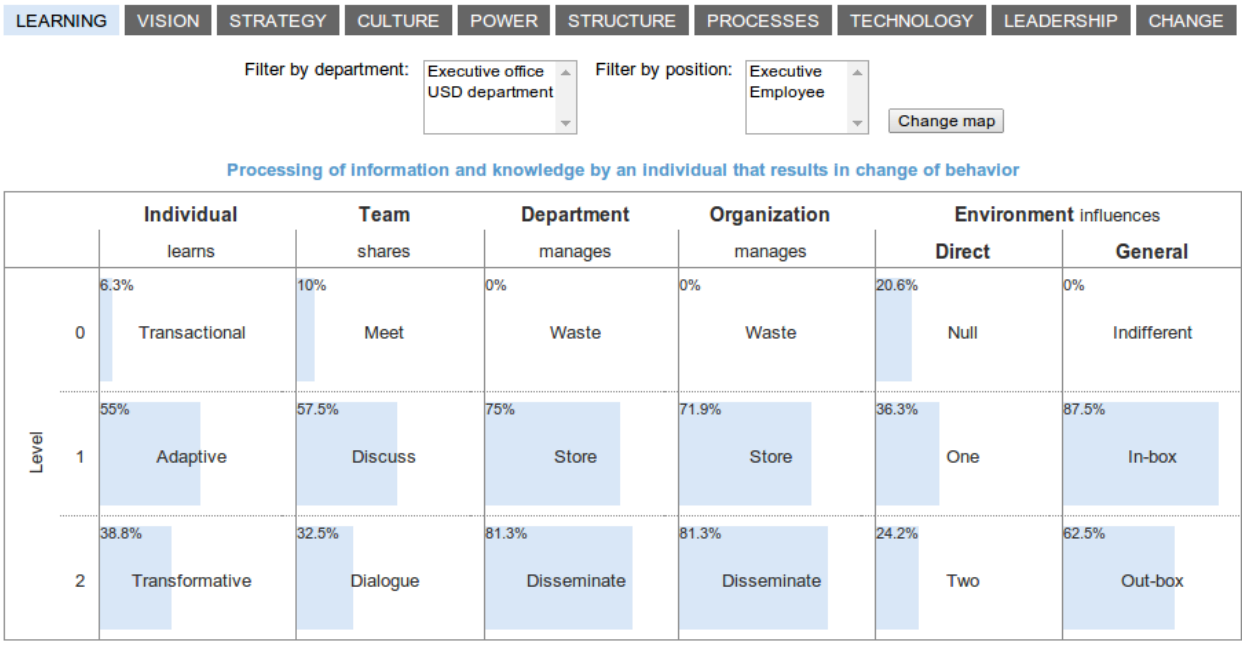

Figure 59: Company D Learning map

appropriately manage the learning. On the other hand, for the direct environment they identify that the direct environment has presence on level 0. This could create problems for the business of company D if they want to develop and implement something new.

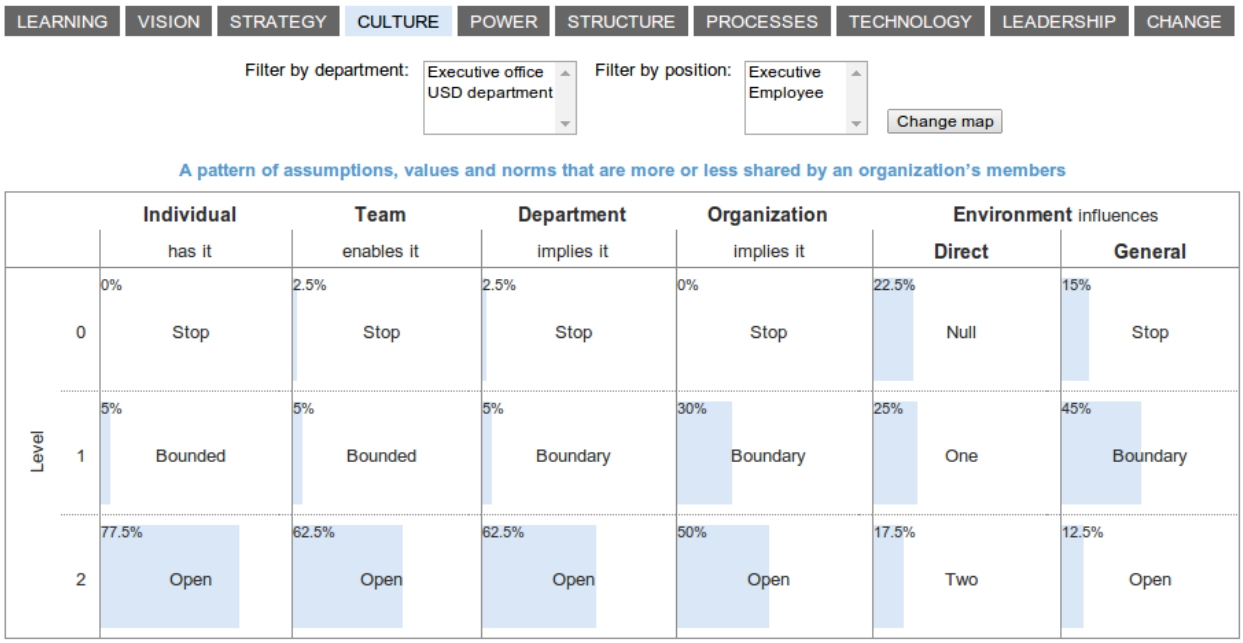

Figure 60: Company D Culture map

Regarding the culture map (Figure 60) we can see strong alignment of the individual, team, department and organization on level 2. The full alignment is compromised only of the organization entity through its presence on level 1. The drill down analysis shows that, although the employees identify stronger "boundary" presence, the executives also acknowledge this presence to a lesser extent.

The full alignment of the entities is achieved in the process map (Figure 61). At least those within company C. On the environmental entities, the dominant perception is that the direct and general environment regarding the processes are positioned on level 0.

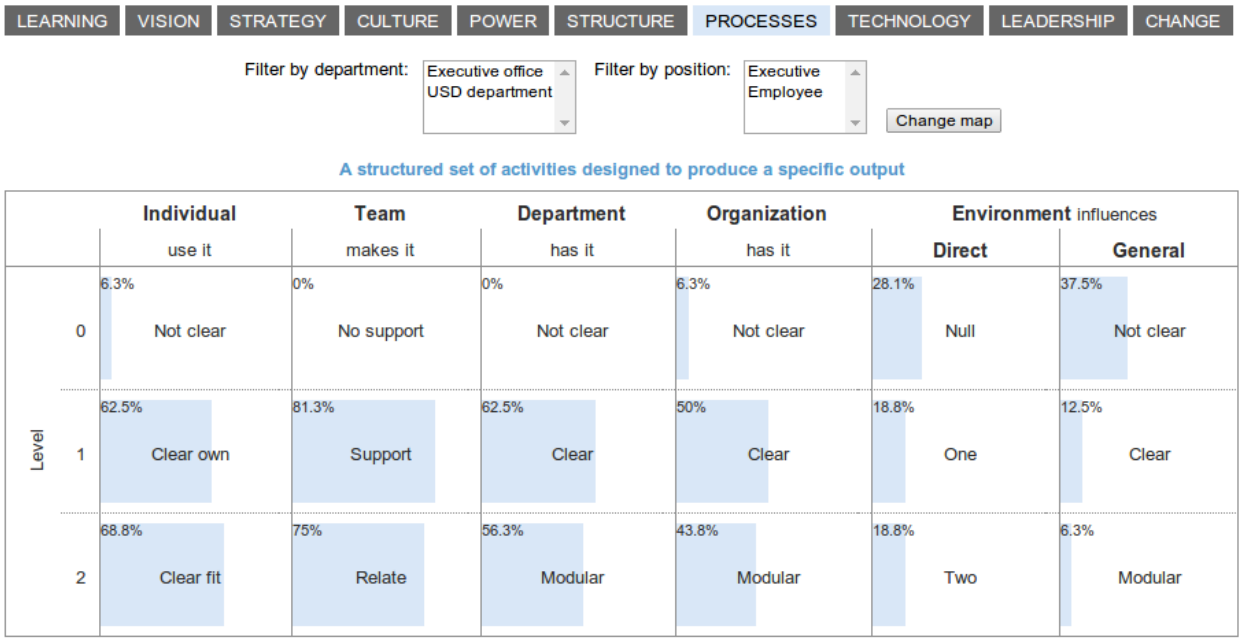

Figure 61: Company D Processes map

7.6.2 Alignment

The alignment map of company D (Figure 62) shows that one aspect for improvement is that the process of development of the organizational vision to be shared and each employee to be able to participate. This is also the case with the power map and lack of presence on level 2 for the entity organization. On other hand, the attention should be given to the organization entity presence on level 0 for structure, technology and change.

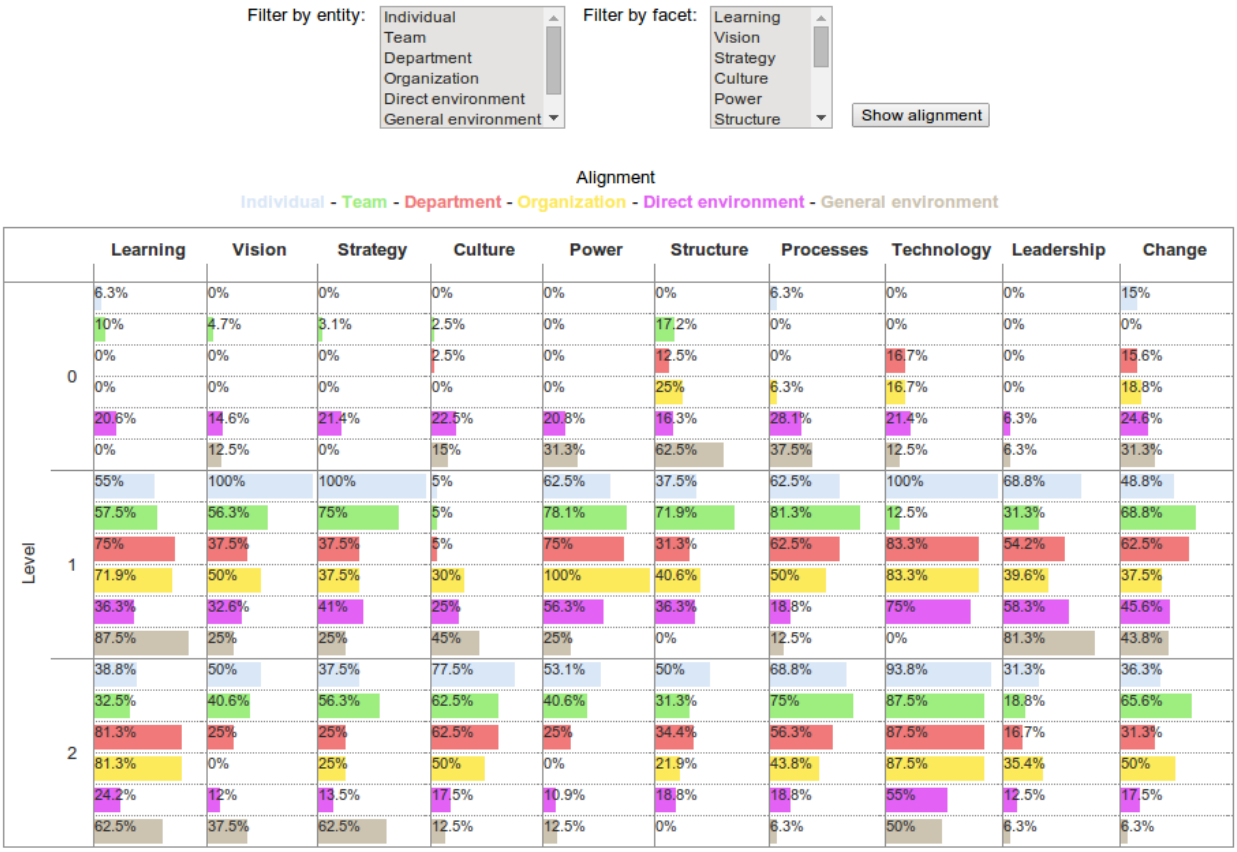

Figure 62: Company D Alignment map

7.6.3 Roadmap

Regarding the presence of level 0 on change map for Individual, Department and Organization the following goal is established: minimize level 0 for the entity Individual, Department, Organization on the Change map. For individual this can be achieved by performing the following activities:

- make a list of the things that are creating problems for you, analyze them, identify how you can solve them, test the new approach, if it works adopt it in everyday work;
- ask other colleagues what they have improved in the past period, ask them what they have done, how you can do it;
- make a list of things that you want to change but which are not changed.

For Department and Organization the following activities can be used:

- introduce a programme (15% change) everyone to change something in their work;
- create a web site on which the personal stories of the employees that changed something are presented;
- introduce a template that the users can use to change;
- measure and, where savings are made based on the changes, reward the employees and place an article about them on the emails of the employee.

For Company D, also, the following goal is identified: move to Level 2 the entity Organization on Vision map. The following activities have been identified.

- organize vision meetings;
- introduce an online platform to communicate ideas for vision;
- issue draft versions of the vision to the interested employees.

7.7 Company E

Company E is a marketing agency active in Macedonia and the region. It has more than 50 employees and offers its services to different types of organizations. The company offers the complete package to its customers: from idea generation and positioning the company to realization of the advertisement and placement in different type of media: TV, radio, print, outdoor or on-line. The company and its employees have won several international awards for the creativity and quality of it work. This is a result of strong focus of the company on creativity and quality. The questionnaires were answered by one executive, two managers and one employee.

7.7.1 Atlas

For company E the power, technology and change map will be analyzed. The power map (Figure 63) shows that level 0 is not present at entity Individual and Team, however, there is presence of Level 0 at entity Department and Organization. Furthermore, there is a decline of level 2 for the two entities. This suggests that there is a need for improvement of these two entities.

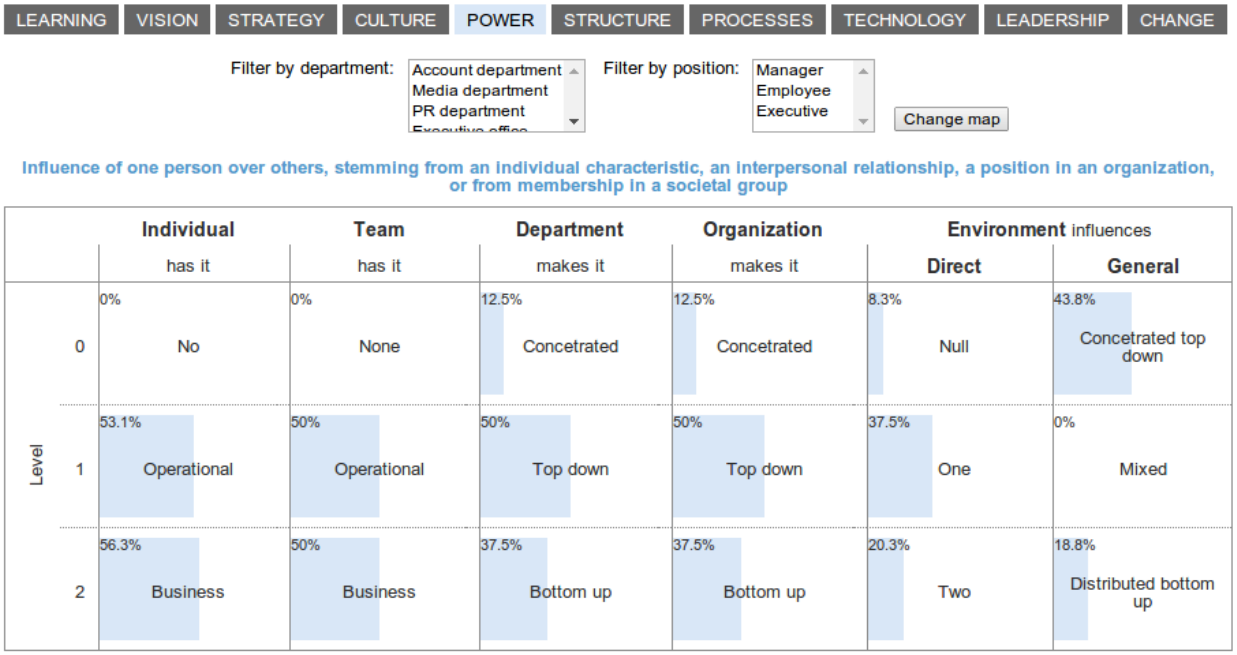

Figure 63: Company E power map

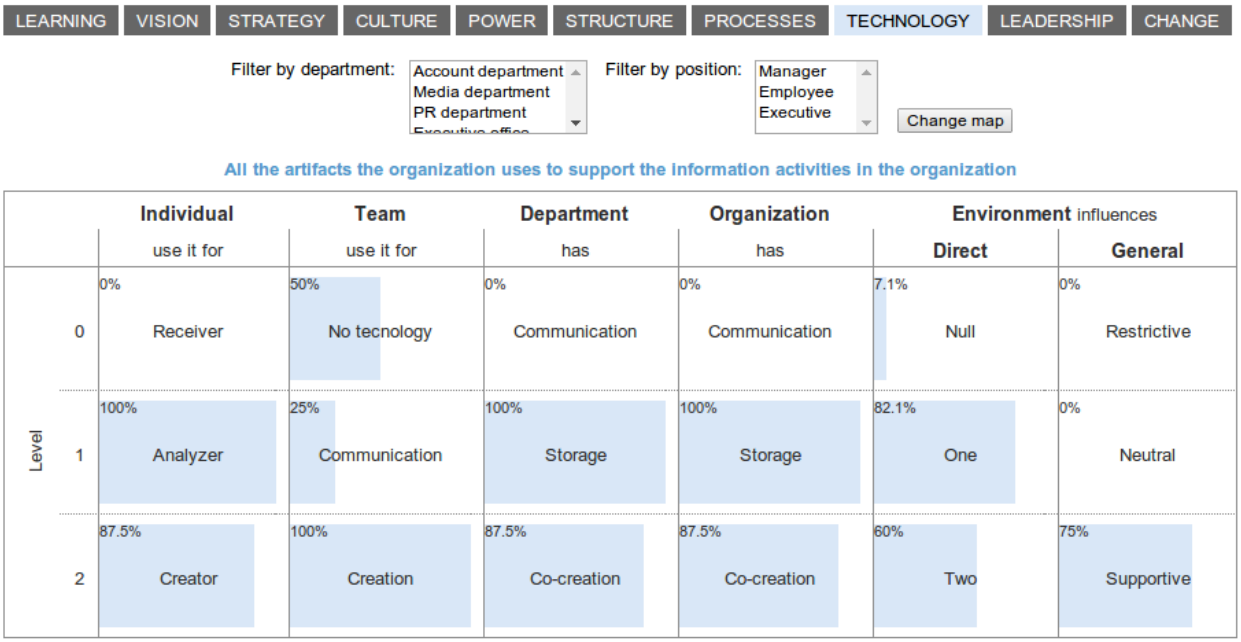

Figure 64: Company E technology map

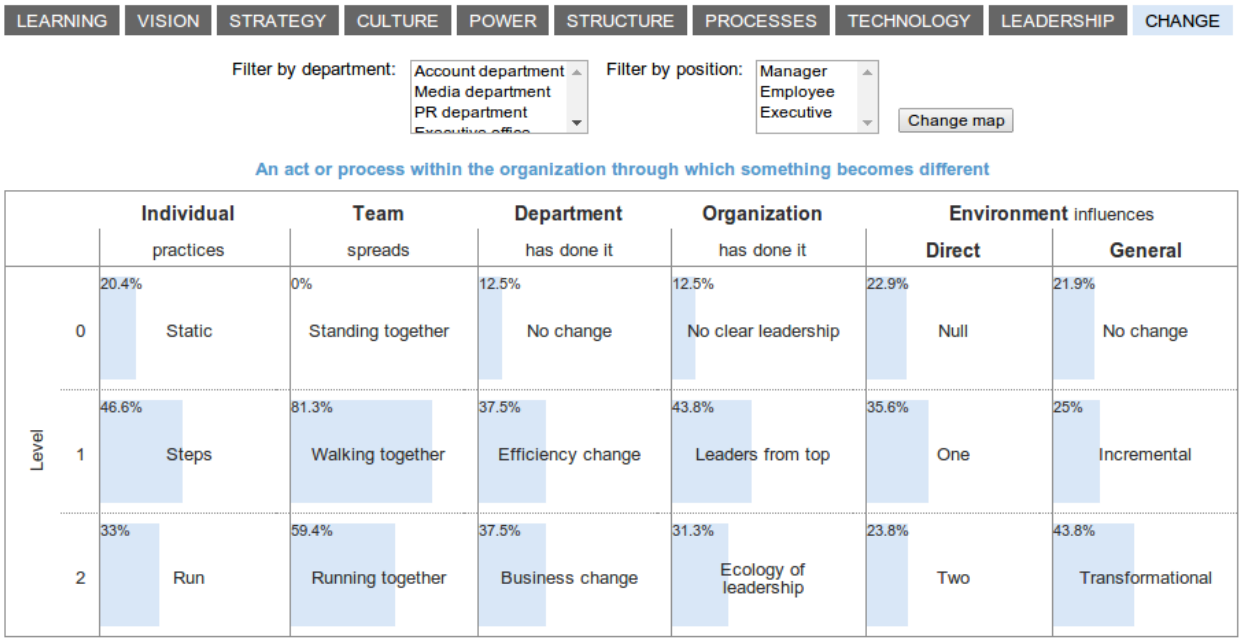

Figure 65: Company E change map

On the technology map (Figure 64) the Team entity has strong presence on level 0 where the teams have only technology for presentation of information, while the technology that enables exchange between them is weakly presented (Level 1). On the other hand, on the Change map (Figure 65) we can see presence of Level 0 in the individual, department, organization and direct and general environment. The presence of reluctance to change in so many entities might create problems when the organization faces crises. Although, the strong presence on level 1 and 2 of the entity team might provide the necessary bond to mitigate this weakness.

7.7.2 Alignment

The alignment of company E (Figure 66) shows that the entity individual has low presence on level 1 on culture, structure and leadership map. This combined with the high presence of entity individual on culture and leadership shows that this organization has the appropriate base to become a learning organization. However, a strong drawback is that for vision and strategy there is no presence on level 2 for entity department and organization. This could minimize the benefits that the culture and leadership can bring, thus, it is needed to implement strategies and actions that will move the entity department and organization towards level 2 on vision and strategy map.

Figure 66: Company E alignment map

7.7.3 Roadmap

Company A can try to achieve the following goals: a) move to Level 1 the entity Individual on the Change Map; and b) move to Level 2 the entity Department and Organization on the Vision and Strategy map. To achieve the first goal Company A can use the following activities:

- make a list of the things that are creating problems for you, analyze them, identify how you can solve them, test the new approach, if it works adopt it in everyday work;
- ask other colleagues what they have improved in the past period, ask them what they have done, how you can do it;
- make a list of things that you want to change but which are not changed.

To achieve the second objective goal it can use the following activities:

- organize vision/ strategy meetings;
- introduce an online platform to communicate ideas for vision/ strategies;
- issue draft versions of the vision/ strategies to the interested employees.

7.8 Methodological evaluation

Four tests have been commonly used to asses the quality of the case study research: construct validity, internal validity, external validity and reliability [Yin, 2009].

7.8.1 Construct validity

Construct validity is identifying correct operational measures for the concepts being studied. Because the concept of learning organization to large extend is subjective concept and the framework includes ten facets to appropriately measure it new questionnaire was developed. As presented in chapter 6 the questionnaire completely followed the guidelines of Fowler [1995; 2008] for measurement of subjective states. Furthermore, to minimize the threats of personal (subjective) interpretation of the questions by the respondents for each questionnaire that evaluated the individual facets on the top of the questionnaire written definition of the facet was provided. Furthermore, structuring the questionnaire through the lenses of levels and entity mirrored the design of the framework. These activities improved the construct validity. Notwithstanding, the threat that questionnaire which is in English language was answered by respondents that English is mother tongue is present.

7.8.2 Internal validity

Internal validity seeks to establish casual relationships, whereby certain conditions are believed to lead to other conditions. However, according to Yin [2009] the concern over internal validity, for case study research, extends to the broader problem of making inferences. He suggests that one way to address the internal validity in case studies is to use the analytic tactics of pattern matching and explanation building. In this direction, in the conclusion of this chapter we identify three patterns and we lay down the ground for explanations for theoretical propositions made about the generative mechanism and axioms in chapter 4.

7.8.3 External validity

External validity refers to defining to which extend a study's findings can be generalized. The small number of cases respondents provides a base for first conclusions for the framework, rather than statistical significant conclusions. However, we still believe that our results provide a

valuable results. Also, through analytical generalization [Yin, 2009] in chapter 8 proposition we show how the framework can be used for modeling the architecture of any organization, not only the learning organization.

7.8.4 Reliability

Reliability is demonstrating that the operations of a study can be repeated with the same results. To achieve this each elements and step of the research is documented and presented in the core PhD document or in it appendices.

Considering this criteria it can be stated that the results of our case studies can be considered as valid. Direction for strengthening this conclusion will be to apply the questionnaire in more companies with more employees.

7.9 Conclusion

In this part reflection about the case studies and the feedback on the artifact is presented. The reflection is presented from a patterns perspective, not on an individual level per company. In this way we try to present the unique results that the Learning Organization Atlas Framework can deliver. The results are:

- you can expect presence of an Entity on each Learning level;
- the misalignment is an embedded property not an exception;
- the state presence is stakeholder biased;
- the “transcend and embeds” relation is non-logical axiom

Presence of an Entity on each Learning level. Through the structure of the Learning Organization Atlas Framework, it is evident that the organizations are not one cut level. Almost each state is present on the maps. This has a strong influence on how the organization can move to the next level. It suggests that all the intentions need to be practised at the same time. This adds to the complexity that the organization needs to manage in order to move to the next levels.

Misalignment is embedded. The Learning Organization Atlas Framework shows that the misalignment is embedded in the organizations and it is not an exception, but a rule. Thus, when the organizations need to move to the next level, it can be expected that a tailored learning organization road map is created for each organization. The framework supports the creation of own path and development of distinctive capabilities that could provide a unique competitive advantage in time of crises.

The state presence is stakeholder biased. This can be noted when the drill down was performed on certain maps and there were differences between the employees and the executives. This shows that the strategies for achieving the higher level of development should further be customized to the stakeholders that need to implement.

The "transcend and embeds" relation is non-logical axiom. The case studies, within their limitations, show that the relation "transcend and embeds" should be first considered as a non-logical axiom. As non-logical axiom it provides the defining properties for the domain on which the theory can be build, but it is not self-evident truth. This is a result of two outputs in the framework. First, Level 0 is not always present when Level 1 is present and second, certain entities on certain facets show presence on Level 2, but not on Level 1. More in-depth analysis regarding the first output shows that Level 0 is negation of Level 1 and Level 2. For example Level 0 is no presence of learning (or for example no empowerment), where Level 1 and 2 both have presence of learning (or for example empowerment), but different type of learning (empowerment). Thus if all the respondents practice learning (empowerment) Level 0 can stay empty. Regarding the second output, the reasons could be: companies practices and respondents knowledge about entity. The practice of the company influences existence of certain states. For example, company C has only eight employees that work on different issues without strict division in departments, thus it is much easier to organize each organizational member to participate in the development of the vision. Also continuous practising of project-based work for entity Team results in existence of only Level 2 state for Leadership in company A and E and Level 2 for Technology in company B. On the other hand for entity about which the respondents have more limited knowledge e.g. the General environment there is continuous presence of the second output on different facets for different entities. Notwithstanding this justification it should be taken in account that the number of case studies and number of respondents per company has influence on the statistical validation of the axiom. Thus if we increase the number of respondents per company and the number of companies we might confirm the relation "transcend and embeds" as logical axiom.

The case studies provided the following feedback on the framework and the tool:

It takes too much time to answer the questionnaires. There are ten facets and in total more then 180 questions that the respondents need to answer. To lower the burden on the respondents the number of facets can be lowered by determining the most important facets that need to be included. Based on the literature analysis it can be noticed that the facets learning, vision, culture, structure and leadership are the most important facets. Thus, only these facets can be included in the research.

Certain entities are not needed or the respondents have limited knowledge about it. Small organizations do not have departments, thus the entity Department can be eliminated. Furthermore, the respondents have problems to understand the entity General environment and objectively answer the questions. As a result also the entity General environment can be eliminated. In this way the burden on the respondents is lowered for almost 30%.

Finally, for better results from the framework it is important to have larger number of respondents. This could be achieved on constant base if the framework is positioned as appropriate for larger organizations.

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Chapter 8

Conclusion

Boris 'The Blade' Yurinov: Heavy is good. Heavy is reliable. If it doesn't work you can always hit them with it.

Movie “Snatch” [Ritchie, 2001]

8.1 Objective

Having presented the learning organization atlas framework as a multilevel and multifaceted framework for a dynamic development of the LO, and the web tool as its instantiation, this final chapter will focus on four tasks 1) how the proposed framework and its building process respond to the research questions 2) evaluating the outputs of this PhD dissertation, 3) the contributions this PhD dissertation makes and 4) outlining some areas for future research.

Rather than taxonomically showing how the outputs contributed to answering the major research question, in this section we will have a more integral and complementary approach in showing actually that all the outputs contribute and, are a piece of a puzzle that answers the main research question.

This will be used as a base for moving forward and evaluating the outputs of this PhD. The evaluation of the outputs will be based on established criteria for evaluation of the design science research [Hevner et al., 2004; Peffers et al., 2008]. First, an overview of these methodologies will be given and their complementarity. The evaluation of the outputs is closely connected with the contributions that this PhD makes. The contributions will be evaluated through the knowledge contribution framework [Gregor and Hevner, 2013].

Finally, a number of concluding remarks regarding the limitations of this study and possible avenues for further research will be presented.

8.2 Responses to research questions

In the introduction to this PhD we state that despite the extensive debate about the value of learning organizations in order to be competitive, and presentation of it positive sides, the learning organization has also raised a lot of criticism and dilemmas. This criticism is focused on three issues: Concept (What is learning organization?), Methods and models (How to become a learning organization?) and Measurement (How to evaluate the learning organization?). Based on that, the main research question was formulated: How to continuously transform an organization to a learning organization. The goal is to create a multi-attribute and multi-level framework of continuous transformation to a learning organization that will guide the organizations in their pursuit of becoming and staying a learning organization. However, in order to answer this research question and achieve the goal, there was a need to, first, answer the sub-questions. In this way, the pieces were identified and developed, and at the end, they could be fitted together in order to answer the main research question.

RQ 1: What are the elements and relations that define the learning organization?

To lay the ground for the answer of the first research question, first in a detail literature review was done. The output of this research was structured according to the "four-world" framework. Then, we introduced the learning organization conceptual model. Here, in a meta-level, we presented the learning organization elements and their relations. Based on that, by using pattern-oriented modeling, we detailed the elements and their relations. The output is the identification of the generative mechanisms of the learning organization: the learning levels element and "transcends and embeds" axiom. The patterns were used to develop a descriptive, lightweight learning organization ontology. The output is identification of the relations **embeds_in** and **transcends_and_includes**, as important relations through which the learning organization is unique as a concept. Furthermore, it identified the relation **aligned_to** to show how the different entities and learning levels are aligned. In short, the answer to this research question consists of the following pieces: Learning organization conceptual model, learning organization patterns and descriptive lightweight learning organization ontology.

The base for answering the next three research questions is the learning organization atlas framework, a multilevel and multifaceted framework for dynamic development of a learning organization. This framework contains four elements: facets, grid based on lenses, maps and the roadmap. The facets, grid and maps are the base for the roadmap. The roadmap contains the answers to research questions 2, 3 and 4.

RQ 2: How should the learning organization change itself in order to become a learning organization?

Based on the relations identified between the cells on the maps (Figure 36), the engine of the dynamic model was developed. The engine contains intentions that can be achieved through certain strategies. The selection of the most appropriate intentions and strategies is based on results of the questionnaire analysis. Thus, each organization can create a customized path for its development to a learning organization.

RQ 3: How should the learning organization identify the triggers for transformation?
This question is answered through the triggers section in the roadmap. Each section represents one of the five identified trigger types. For each trigger type, decision rules were identified. These rules, combined with the indicators, create the base that will help the organizations to identify the triggers for change.

RQ 4: How we know that the learning organization is continuously transforming?
The answer to this question is provided by the maps that are created through grid application on the facets. By using the developed questionnaires, one organization can evaluate itself on a

certain time interval. The changes in the presence of states from the previous and the subsequent evaluation can indicate whether the organization is continuously transforming to a learning organization.

This brings us to the answer of the main research question: How to continuously transform an organization to a learning organization? The answer to this question is the instantiated web tool of the learning organization atlas framework. The theory and the logic presented in the atlas framework, through a logical and easy navigation, was included in the web tool. The web tool has the identify, atlas, alignment and roadmap sections. Through the identify section, data about the as-is state of the organization willing to become a learning organization is collected. The identify section instantiates the learning organization facets and grid through ten questionnaires, one for each facet. The atlas contains all the facet maps created through the analysis of the answered questionnaires. Each cell on the map contains characteristics that an entity should have in order to be on that developmental level. The alignment summary map, based on the maps in the atlas, provides a comparison between the states of different entities and different facets. The roadmap provides guidelines on strategies and actions that the organization can use in order to move from one level to another level for entity and facet. Following the plurality of the integral approach, the roadmap section generates a number of strategies and actions that can be used.

8.3 PhD dissertation's outputs evaluation

According to Hevner et al. [2004], “design science...creates and evaluates IT artifacts intended to solve identified organizational problems”. Regarding the create part, what distinguishes the information systems as design science from the practice of building IT artifacts, is the application of a rigorous process of constructing the IT artifacts [Iivari, 2007]. The rigorous process should show how we came to the artifact. In this direction, Iivari [2007] claims that: the construction process should be made as transparent as possible if it is to be considered a design science activity. It is not enough for the artifact to just come out of the blue.

The transparency of the process of creation of the artifacts, and answering the research questions is achieved in the following way:

- First, a chapter is devoted to the solution approach. In it, textually and graphically, it is presented how the solution will be developed. What is the structure of the approach, the methods that will be used and the time line that will be followed;
- Second, in State of the art chapter, it is clearly explained how the literature was identified and how it was analyzed. This enables other researchers to repeat the process;

- Third, regarding the lightweight ontology, first the patterns were identified, each pattern was graphically represented and, then, the generative mechanisms were identified. This created a solid and clear base for creation of the ontology, justification of the entities and the relations;
- Fourth, by introducing the analogy with the maps, it is shown how the idea for the structure of the learning organization atlas framework came. Then, by building on the conclusions of the patterns and the ontology, the grid was developed. The state of art was used for identification of the facets and the content of the maps. The roadmap was build on the intention-driven MAP methodology and using the output of the state of art, patterns and the ontology;
- Fifth, the process of transformation of the learning organization atlas framework to web tool, the structure of the web tool and how it functions are presented in chapter 6. Furthermore, in the appendices the questionnaire indexing and the formulas for creation of the maps are presented;
- Finally, the process went step by step in creating all the outputs identified by March and Smith [1995] constructs, models, methods and the tool. In this way, it is shown how all the outputs add and complement to each other in order to answer the main research question.

Regarding the evaluation, each proposed design science methodology includes the evaluation as a step in the methodology [Hevner, 2007; Hevner et al., 2004; March and Smith, 1995; Peffers et al., 2008; Vaishnavi and Kuechler, Jr, 2007; van Aken and Romme, 2009]. According to Peffers et al. [2008], demonstration should also be included as evaluation in order to prove that the idea works. i.e., show how the artifact helps to solve one or more instances of the problem. This could involve its use in experimentation, simulation, case study, proof, or other appropriate activity. The evaluation activity involves comparing the objectives of a solution to actually observed results from use of the artifact in the demonstration. Conceptually, depending on the nature of the problem, venue and the artifact, evaluation could include any appropriate empirical evidence or logical proof.

First, the validity of this PhD's outputs is achieved through the papers that were published at conferences or in journals (Table 39). Each published paper is reviewed by two, three or more reviewers. Because each reviewer is an expert or knowledgeable about the content of each paper, this logically validates the outputs. Because each paper's content is the content of this PhD, the PhD outputs are also validated. Furthermore, through the review process the feedback from the reviewers was implemented in the papers and subsequently in the PhD dissertation.

PhD thesis outputs		Paper about the output accepted at conference/ journal
1	Learning organization patterns	Knowledge Management Research & Practice journal, 2014
2	Learning organization ontology	Word Conference on Information Systems and Technologies, Madeira island, Portugal, 2014
3	Learning Organization Atlas Framework	International Conference on Enterprise Information Systems, Angers Loire Valley, France, 2013 The first AIS-Journals Joint Author Workshop in ECIS, Tel Aviv, Israel, 2014
4	IT prototype	26th Bled eConference, Bled, Slovenia, 2013 22nd European Conference on Information Systems, Tel Aviv, Israel, 2014

Table 39: Papers about the output accepted at conference/ journal

Second, the artifact was compared with two existing tools, the Dimensions of the Learning Organization Questionnaire (DLOQ) available at www.partnersforlearning.com/instructions.html and the Learning organization survey (LOS) available at http://los.hbs.edu (Table 40).

Third, the prototype was presented at two conferences. The comments of the participants on the sessions were that the "prototype has a business value", "it can be useful for larger enterprises". "it provides a new way of modeling the organization" and "it can also be used as a maturity model of organizations".

Fourth, the Learning Organization Atlas Framework was piloted in one company with one executive, two managers, and two employees. Based on their comments and suggestions, the framework was improved.

Fivth, the tool was applied to five companies. In each of the companies, the executives, managers and employees answered the questionnaires. The questionnaires were used as input in the tool through which the as-is and the to-be state of the companies were identified, and customized strategies to achieve the to-be state were given.

Finally, according to Wieringa [2009] the identified requirements in chapter 5 could be used for evaluation of the framework. In chapter 5 six requirements were identified for the Learning Organization Atlas Framework. The first requirement is that the framework *must allow inclusion*

of large number of facets, attributes and values. The framework completely fulfills this requirement. By innovative structuring of the facets, lenses and maps in the framework large majority of the identified facets and attributes were accommodated in the framework. Furthermore, by using the learning levels and entity levels as lenses through which the facets are viewed the framework fulfills the third requirement "*must allow multilevel representation of the learning organization facets"*. Each facet is represented through three learning levels and six entities. The resulting grid and the questionnaire enables the fulfillment of the second requirement "*must represent the relations* **embeds_in**, **transcend_and_include** and **align_to"**. The grid provides a structural and visual fulfillment of this requirement, while the questionnaires provide the content for fulfillment of the requirement. Although, the "transcend_and_include" relation is non-logical axiom it is sufficient to fulfill the second requirement. The introduction of the roadmap and presentation and explanation of the relations between the cells, five triggers and seven sections presented in chapter 5 are appropriate *means to contextualize the path to becoming a learning organization in accordance to organization's characteristics*. Thus the forth requirement can be considered fulfilled. The innovative structure of the framework and the possibility to add or subtract facets or entities provides and embeds the necessary flexibility that the framework should have according to fifth requirement "*must embeds flexibility through which it can be customized"*. Finally, the developed and tested Web tool, presented in chapter six and seven, fulfills the sixth requirement "*must include tool for support of the development of the learning organization"*

	DLOQ	**LOS**	**LOAF web tool**
Focus of the tool	only evaluate	evaluate and benchmark	evaluate, compare, analyze and design
Number of entities involved in the tool	three (individual, team, organization)	one (unit)	Six (individual, team, department, organization, direct environment, general environment)
Type of questions	one (likert)	one (likert)	multiple (likert, sum up, yes/no, sliding)
Visual display	poor	medium	good
Option to drill down	no	no	yes
Option to create different output	no	no	yes (through filters)
Guidelines for development	no	no	yes

Table 40: Comparative overview of three tools

8.4 Contributions and limitations of this dissertation

According to Gregor and Hevner [2013], often identifying a knowledge contribution is difficult in DSR because it depends on the nature of the designed artifact, the state of the field of knowledge, the audience to whom it is to be communicated, and the publication outlet. They have proposed a knowledge contribution framework [Gregor and Hevner, 2013] to enable the identification of knowledge contribution. The four quadrants in the framework are a result of two axis: The x-axis shows the maturity of the problem context from high to low. The y-axis represents the current maturity of artifacts that exist as potential starting points for solutions to the research question, also from high to low. The contributions of this PhD are in the improvement quadrant i.e., new solutions for known problems.

The learning organization's problems are clearly identified in the scientific and business literature. In chapter one I summarised them as: What is a learning organization? (Concept), How to become a learning organization? (Methods and models) and, How to evaluate the learning organization? (Measurement).

Through this PhD dissertation, an attempt was made to provide an answer to these questions. Through the outputs of this PhD, a contribution to the prescriptive knowledge about learning organization is made. More concretely:

- The patterns and ontology provide the vocabulary and symbols to understand the learning organizations' entities and relations. Furthermore, the descriptive lightweight learning organization ontology is an appropriate base for development of more formal ontology;
- The learning organization conceptual model and the learning organization atlas framework take into account the challenges of the learning organization, and provide an innovative approach in representing and measuring the learning organization;
- The road map provides a practice - how the learning organization can be developed. It introduces the complete set of triggers, strategies and sets;
- Finally, through the development of a complete tool, as an artifact that instantiates the developed constructs, models and methods, this PhD provides an option that the companies can use to build their organizations as learning organizations.

However, this dissertation comes with certain limitations that need to be taken into account when interpreting this dissertation.

- the literature review was done from large number of articles, this enabled inclusion of articles and research that might not be of high quality. Furthermore, some topics like politics are rarely discussed in the articles. As a result, some of the facets and the relations within the patterns might not be based on previous high quality research, or not sufficiently supported with previous research;
- the ontology is only descriptive lightweight ontology. For this PhD it is sufficient, however, having a formal ontology could provide a more solid base for confirmation of the identified entities and relations. Furthermore, the ontology is completely based on the literature, there was no larger consultation with other experts and researchers through which the ontology could be enriched and confirmed;
- the strength of the framework is the flexibility to add and subtract facets in the atlas, however, this is also a weakness of the framework. The weakness is that there is no guideline on how many facets are sufficient, or what is the impact of using eight instead of ten facets i.e. maps;
- the numbers of questionnaires and the number of questions is too high. There are ten questionnaires with more than 180 questions. The respondents need between 45 minutes to one hour to answer the questionnaire. It was not identified with the respondents used in the PhD, but it might happen that the respondents get tired or bored answering the questionnaire, and not answering the questionnaire with the needed attention.

8.5 Future work

Four avenues for future research are identified. One is the development of heavyweight ontology of the learning organization. The descriptive lightweight learning organization ontology [Santa and Nurcan, 2014b] provides a sufficient base development of heavyweight ontology [Davies, 2010]. Through the heavyweight ontologies the cardinality constraints will be added, standalone axioms identified, statements will be reified and more.

Based on the feedback on the artifact another avenue is to explore the opportunities for positioning and transforming the Learning Organization Atlas Framework into Integral Enterprise Ambition Framework. The ambition of the organization will be the central and guiding element of the new framework. The research should identify the levels and relations between the ambition's levels. For example, Level 1 ambition can be operational excellence and Level 2 ambition could be business innovation. Then the research should develop mechanisms that, depending of the ambition, will provide tailored questionnaires to provide performance metrics for selected facets and develop customized path. The suggestion from the framework and tool feedback to use vision, learning, culture, leadership, and structure as main facets could be further

explored. This framework could provide a substitute for the existing Balanced Scorecard [Kaplan and Norton, 1996] by using the novelty of the atlas approach developed in this PhD.

Another avenue for research is to explore how the atlas framework can be used for modeling the enterprise architecture. By taking the position that the enterprise architecture should take into account and represent the visible and invisible enterprise, the applicability of the atlas framework should be explored. This research could be important because the current enterprise modeling frameworks like Zachman [Sowa and Zachman, 1992], TOGAF [The Open Group, 2009], ArchiMate [Iacob et al., 2009] and to large extend Business Model Canvas [Osterwalder et al., 2010] focus more on the formal part, on the operating issues and are based on machine like logic of the organization [Wagter et al., 2012]. They do not include the domains from the invisible enterprise. On the other hand, attempts are made by other authors to show that in order to create a realistic model of the enterprise domains from both parts need to be included. Frank [2012] created the multi-perspective enterprise model that is an enterprise model that emphasizes accounting for perspectives; and Wagter et al. [2012] developed the Enterprise Coherence Framework (ECF), which enables a more explicit reasoning about the coherence between the relevant aspects of an enterprise. Although these frameworks advance the enterprise modeling, they as the previously mentioned frameworks predetermine the domains that are included in the model. Furthermore, they do not present a way how to match the formal and the tacit part of the enterprise. The last two issues undermine the flexibility that these frameworks can provide and clear guideline how to align (make coherent) the formal and tacit enterprise. The research should result in proposal how the atlas framework structure can be used for enterprise architecture modeling.

Finally, improvement of the existing, or development of a new theory. Vaishnavi and Kuechler, Jr [2007] included better theories as one output of the design science research. One distinct way, through which design science research can contribute to better (or new) theories, is through increasing the understanding of the relations between the artifact's elements. The increased understanding can contribute to potentially falsifying or elaborating on previously theorised relationships. The avenue for research is to explore - can it, and how the atlas framework can create a new theory for modeling organizations.

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Appendix A

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Appendix C

LEARNING
processing of information and knowledge by an individual that results in change of behavior

(1) Please divide 100 points to different types of learning that is practiced (more points you give, more that type of learning is practiced)	**By you personally**	**Generally by others in your organization**	**Generally by people, you cooperate with, in other organizations**
(1-1) No learning (only received information that may lead to learning, but have not practiced learning)	1-1a	1-1b	1-1c
(L1-2) Adaptive learning (learning through which the obtained information are used to correct or improve procedures, existing competences, technologies and paradigms without necessarily examining or challenging the underlying beliefs and assumptions of the organization)	1-2a	1-2b	1-2c
(L1-3) Generative learning (learning that involved the modification of the organization's underlying norms, policies and objectives, that made me able to see beyond the situation and questioning operating norms	1-3a	1-3b	1-3c
TOTAL is 100			

	In your department	**In your organization**	**In other organizations you cooperate with**
(L2-1)The teams only meet and exchange information for mere reporting purpose with no goal to support learning	2-1a	2-1b	2-1c
(L2-2)In the teams different views are presented and defended and there is a search for the best view to support decisions that must be made at this time	2-2a	2-2b	2-2c
(L2-3)In the teams complex issues are explored by presenting different views as a means toward discovering a new view. The assumptions the team members have are presented and examined.	2-3a	2-3b	2-3c
TOTAL is 100			

	In your department	**In your organization**	**In other organizations you cooperate with**
(L3-1)The existing information and knowledge that is circulating is collected	1. Always 3-1a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 3-1b 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always3-1c 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know

(L3-2)The existing information and knowledge that is circulating is stored	1. Always 3-2a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 3-2b 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always3-2c 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know
(L3-3)The collected information and knowledge is made available to teams and individuals in various ways	1. Strongly Agree 3-3a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 3-3b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree3-3c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

(L4-1)In your opinion, the general environment in which your organization operates is supportive for adaptive learning (learning that focuses on correcting or improving existing procedures, processes, competences and technologies)

1 – Strongly agree 2 – Agree 3 – Neutral 4 – Disagree 5 – Strongly disagree 4-1a

(L4-2)In your opinion, the general environment in which your organization operates is supportive for transformative learning (learning that focuses on correcting or improving existing procedures, processes, competences and technologies
1 – Strongly agree 2 – Agree 3 – Neutral 4 – Disagree 5 – Strongly disagree 4-2b

VISION
where the organization wants to be in the future

Your organization has a vision 1-1a Yes (1) No (2)	The organizations, you cooperate with, have a vision 1-1b All (1) Majority (2) Minority (3) None (4) I don't know (5)
You know the vision of your organization 1-2a Yes (1) No (2)	People, you cooperate with, from other organizations know the vision of their organization 1-2b All (1) Majority (2) Minority (3) None (4) I don't know (5)
You have participated in the development of the vision of your organization 1-3a Yes (1) No (2)	People, you cooperate with, from other organizations have participated in the development of the vision of their organization 1-3b All (1) Majority (2) Minority (3) None (4) I don't know (5)
During your participation in the development of the vision you were able to present your personal views about what the vision should be 1-4a Yes (1) No (2)	People, you cooperate with, from other organizations are able to present their personal views about what the vision should be 1-4b All (1) Majority (2) Minority (3) None (4) I don't know (5)

	In your department	**In your organization**	**In other organizations you cooperate with**

The vision is created through teams	1. Strongly Agree 2-1a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2-1b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2-1c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
The vision is distributed through teams	1. Strongly Agree 2-2a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2-2b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2-2c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

		In your department	**In your organization**	**In other organizations you cooperate with**
The vision is made				
	only by the top management	□ 3-1a	□ 3-1b	□ 3-1c
	by the top and middle level managers	□ 3-2a	□ 3-2b	□ 3-2c
	by everybody in the organization	□ 3-3a	□ 3-3b	□ 3-3c
	You don't know	□ 3-4a	□ 3-4b	□ 3-4c

The forces in the general environment are aligned around one vision 4-1a

1 - Strongly Agree 2 - Agree 3 - Neutral 4 - Disagree 5 - Strongly disagree

The influence of the the general environment on the vision development process is 4-2b

1 – Supportive 2 – Mainly supportive 3 – Neutral 4 – Mainly restrictive 5 – Restrictive

STRATEGY

Strategy is creation of a unique and valuable position, through creating fit among and integrating company's activities and by making trade-offs in competing

Your organization has a strategy 1-1a Yes (1) No (2)	The organizations, you cooperate with, have strategy 1-1b All (1) Majority (2) Minority (3) None (4) I don't know (5)
You know the strategy of your organization 1-2a Yes (1) No (2)	People, you cooperate with, from other organizations know the strategy of their organization 1-2b All (1) Majority (2) Minority (3) None (4) I don't know (5)
You have participated in the development of the strategy	People, you cooperate with, from other organizations have participated in

of your organization 1-3a Yes (1) No (2)	the development of the strategy of their organization 1-3b All (1) Majority (2) Minority (3) None (4) I don't know (5)
During your participation in the development of the strategy your were able to present your personal views about what the strategy should be 1-4a Yes (1) No (2)	People, you cooperate with, from other organizations are able to present their personal views about what the strategy should be 1-4b All (1) Majority (2) Minority (3) None (4) I don't know (5)

	In your department	**In your organization**	**In other organizations you cooperate with**
The strategy is created through teams	1. Strongly Agree 2-1a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2-1b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2-1c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
The strategy is distributed through teams	1. Strongly Agree 2-2a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2-2b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2-2c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

		In your department	**In your organization**	**In other organizations you cooperate with**
The strategy is made				
	only by the top management	□ 3-1a	□ 3-1b	□ 3-1c
	by the top and middle level managers	□ 3-2a	□ 3-2b	□ 3-2c
	by everybody in the organization	□ 3-3a	□ 3-3b	□ 3-3c
	I don't know	□ 3-4a	□ 3-4b	□ 3-4c

The forces in the general environment are aligned around one strategy 4-1a 1 - Strongly Agree 2 - Agree 3 - Neutral 4 - Disagree 5 - Strongly disagree
The influence of the the general environment on the strategy development process is 4-2b 1 – Supportive 2 – Mainly supportive 3 – Neutral 4 – Mainly restrictive 5 – Restrictive

CULTURE
a pattern of assumptions, values and norms that are more or less shared by an organization's members

	You personally	Members of the teams you participate in	People in your department	People in your organization	People in other organizations you cooperate with,	People in the general environment
share ideas	1. Strongly Agree 1-1a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-1b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-1c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-1d 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-1e 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 1-1f 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
take actions with higher risks	1. Strongly Agree 1-2a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-2b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-2c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-2d 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-2e 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 1-2f 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
openly speak opinion without being afraid	1. Strongly Agree 1-3a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-3b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-3c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-3d 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-3e 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 1-3f 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
make experiments	1. Strongly Agree 1-4a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-4b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-4c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-4d 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-4e 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 1-4f 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
make mistakes and are tolerated for that to certain extend	1. Strongly Agree 1-5a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-5b 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-5c 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-5d 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 1-5e 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 1-5f 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

POWER

Influence of one person over others, stemming from an individual characteristic, an interpersonal relationship, a position in an organization, or from membership in a societal group

	To you personally	Generally to others in your organization	Generally to people, you cooperate with, in other organizations
Powers that people do not normally have are given to them in order to expand their influence on other people and areas on operational level	1. Always 1-1a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 1-1b 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know	1. Always 1-1c 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know
Powers that people do not normally have are given to them in order to expand their influence on other people and areas on a business level like strategy, vision	1. Always 1-2a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 1-2b 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know	1. Always 1-2c 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know

	In your department	In your organization	In other organizations you cooperate with
The teams are given powers that they do not normally have to expand their influence on other people and areas on a operational level	1. Always 2-1a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 2-1b 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 2-1c 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know
The teams are given powers that they do not normally have to expand their influence on other people and areas on business level like strategy, vision	1. Always 2-2a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 2-2b 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 2-2c 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know

	In your department	In your organization	In other organizations you cooperate with
The power is			
concentrated in the top management	□ 3-1a	□ 3-1b	□ 3-1c
concentrated in the top and middle level managers	□ 3-2a	□ 3-2b	□ 3-2c
distributed to everybody in the organization	□ 3-3a	□ 3-3b	□ 3-3c
I don't know	□ 3-4a	□ 3-4b	□ 3-4c

	In your department	In your organization	In other organizations you cooperate with
The process of empowerment (sharing power) is			
managed by the top management	□ 4-1a	□ 4-1b	□ 4-1c
each individual decides what to share	□ 4-2a	□ 4-2b	□ 4-2c
not managed by anybody	□ 4-3a	□ 4-3b	□ 4-3c
I don't know	□ 4-4a	□ 4-4b	□ 4-4c

In your society you can be empowered only if the people and institutions that have the power give you power and empower you 5-1a 1 – Strongly agree 2 – Agree 3 – Neutral 4 – Disagree 5 – Strongly disagree In your society the power concentrated in several institutions and people 5-2b 1 – Strongly agree 2 – Agree 3 – Neutral 4 – Disagree 5 – Strongly disagree

STRUCTURE

represents the formal way of identifying who is to take responsibility for what; who is to exercise authority over whom; and who is to be answerable to whom

	Your position	**Generally the position of others in your organization**	**Generally the positions of people, you cooperate with, in other organizations**
in the organization are clearly determined	1. Strongly Agree 1-1a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 1-1b 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 1-1c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
provide flexibility to adapt it and extend it	1. Strongly Agree 1-2a 2. Agree 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 1-2b 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 1-2c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

	In your department	**In your organization**	**In other organizations you cooperate with**
the structure supports functional teams that are formed to work on operational issues	1. Strongly Agree 2. Agree 2-1a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 2-1b 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 2-1c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
the structure supports organizational teams that are formed to work on all organizational issues	1. Strongly Agree 2. Agree 2-2a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 2-2b 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 2-2c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

	In your department	**In your organization**	**In other organizations you cooperate with**
The structure is			
Very hierarchical	□ 3-1a	□ 3-1b	□ 3-1c
Hierarchical	□ 3-2a	□ 3-2b	□ 3-2c
Organic	□ 3-3a	□ 3-3b	□ 3-3c

	In your department	In your organization	In other organizations you cooperate with
The structure is flexible and is changed as needed	1. Always 4-1a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 4-1b 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 4-1c 2. Often 3. Sometimes 4. Rarely 5. Never 6. I don't know

The institutions in the general environment are bureaucratic in their structure 5-1a 1 – Strongly agree 2 – Agree 3 – Neutral 4 – Disagree 5 – Strongly disagree
The structure of the institutions in the general environment is flexible and is changed as needed 5-2b 1 – Strongly agree 2 – Agree 3 – Neutral 4 – Disagree 5 – Strongly disagree

PROCESSES
A structured set of activities designed to produce a specific output

	Your personally	Generally the people in your organization	Generally the people, you cooperate with, in other organizations
know what processes are needed to follow in order to do the job	1. Strongly Agree 2. Agree 1-1a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 1-1b 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 1-1c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
know how the job processes are interrelated to the other processes in the organization	1. Strongly Agree 2. Agree 1-2a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 1-2b 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 1-2c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

	In your department	In your organization	In other organizations you cooperate with
The teams provide support in identifying your work related processes	1. Strongly Agree 2. Agree 2-1a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 2-1b 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 2-1c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
Through teams your are able to relate your processes among each other and identify how to fit your role in the organizational processes	1. Strongly Agree 2. Agree 2-2a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 2-2b 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 2-2c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

	In your department	In your organization	In the organizations you cooperate with	In your general environment
The working processes are clear	1. Strongly Agree 2. Agree 3-1a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-1b 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-1c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 3-1d 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
There is good integration of different processes	1. Strongly Agree 2. Agree 3-2a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-2b 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-2c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 3-2d 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
The processes are modular and can be divided and rearranged without loosing their power to produce the specific output	1. Strongly Agree 2. Agree 3-3a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-3b 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-3c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 3-3d 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

TECHNOLOGY
all the artifacts the organization uses to support the information activities in the organization

		In your department	In your organization	In other organizations you cooperate with
The technology available enables				
	the communication between the employees	□ 1-1a	□ 1-1b	□ 1-1c
	storage of information by the employees	□ 1-2a	□ 1-2b	□ 1-2c
	Creation of information by the employees	□ 1-3a	□ 1-3b	□ 1-3c
	Co-creation of information by more employees	□ 1-4a	□ 1-4b	□ 1-4c
	Sharing of the information between the employees	□ 1-5a	□ 1-5b	□ 1-5c

	In your department	In your organization	In other organizations
There is dedicated communication technology for team work	Yes (1) No (2) 2-1a	Yes (1) No(2) 2-1b	Yes(1) No(2) I don't know 2-1c

		In your department	In your organization	In other organizations
On a team level the technology is used				
	Only to exchange information between the team members	□ 3-1a	□ 3-1b	□ 3-1c
	To exchange and co-work together on creating the	□ 3-2a	□ 3-2b	□ 3-2c

	information			

	By you personally	Generally by others in your organization	Generally by people, you cooperate with, in other organizations
To do everyday work the communication technology is used to			
Receive information	□ 4-1a	□ 4-1b	□ 4-1c
Create information	□ 4-2a	□ 4-2b	□ 4-2c
Co-create information with my colleagues	□ 4-3a	□ 4-3b	□ 4-3c
Search information	□ 4-4a	□ 4-4b	□ 4-4c
Share information	□ 4-5a	□ 4-5b	□ 4-5c

The influence of the the general environment on the new technology adaptation is 5-1a

1 – Supportive 2 – Mainly supportive 3 – Neutral 4 – Mainly restrictive 5 – Restrictive

LEADERSHIP
the process of providing direction and influencing individuals or groups to achieve goals

You see yourself as a leader 1-1a		
Yes	No	I don't know

Operational leader A leader that focuses on increasing the efficiency, establishing and standardizing procedures	What type of leader you are 2-1a □ □ □ □ □	Transformational leader A leader that makes the people to go beyond the borders by challenging things

	Your team	**Your department**	**Your organization**	**Other organizations**	**General environment**
You have leaders in	1. Strongly Agree 2. Agree 3-1a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-1b 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-1c 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 3-1d 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 3-1e 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

		What type of leaders you have in	
Your department	Operational 4-1a	□ □ □ □ □	Transformational
Your organization	Operational 4-2a	□ □ □ □ □	Transformational
In the other organizations	Operational 4-3a	□ □ □ □ □	Transformational
In the general environment	Operational 4-4a	□ □ □ □ □	Transformational

	Department	**Organization**	**Other organizations**	**General environment**
The leaders are concentrated at the top positions in the	1. Strongly Agree 2. Agree 5-1a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 5-1b 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 5-1c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 5-1d 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

	In your teams	**In your department**	**In your organization**	**In other organizations**
The leaders emerge by them self, they are not appointed by somebody else	1. Strongly Agree 2. Agree 6-1a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 6-1b 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 6-1c 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 6-1d 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

CHANGE

an act or process within the organization through which something becomes different

Please divide 100 points to different types of change that has been done (more points you give, more that type of change is practiced)	**By you personally**	**Generally by other people in your organization**	**Generally by the people, you cooperate with, in other organizations**
No change do work is done in the same way	1-1a	1-1b	1-1c
Incremental changes small changes that improve the work	1-2a	1-2b	1-2c
Transformational changes radical changes that have significantly improved the work	1-3a	1-3b	1-3c
Total 100			

What type of changes are done in the following entities	**Department**	**Organization**	**Other organizations**	**General environment**
small incremental changes	1. Strongly Agree 2. Agree 2-1a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree2-1b 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 2-1c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 2-1d 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know
Radical transformational changes	1. Strongly Agree 2. Agree 2-2a 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 2-2b 3. Neutral 4. Disagree 5. Strongly disagree	1. Strongly Agree 2. Agree 2-2c 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know	1. Strongly Agree 2. Agree 2-2d 3. Neutral 4. Disagree 5. Strongly disagree 6. I don't know

	Incremental change	**Transformational change**
In our organization is initiated through teams	1. Always 3-1a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 3-1b 2. Often 3. Sometimes 4. Rarely 5. Never
In our organization is realized through teams	1. Always 3-2a 2. Often 3. Sometimes 4. Rarely 5. Never	1. Always 3-2b 2. Often 3. Sometimes 4. Rarely 5. Never

Appendix D

LEARNING
processing of information and knowledge by an individual that results in change of behavior

Level	**Individual** learns	**Team** shares	**Department** manages	**Organization** manages	**Environment** influences	
					Direct	**General**
0	Transactional (A+B)/2 A=(Σ1-1a)/N B=(Σ1-1b)/N	Meet (A+B)/2 A=(Σ2-1a)/N B=(Σ2-1b)/N	Waste (A+B)/2 A=(Σ3-1a5)/S B=(Σ3-2a5)/S	Waste (A+B)/2 A=(Σ3-1b5)/S B=(Σ3-2b5)/S	Null (A+B+C+D)/4 A=(1-1c)/N B=(2-1c)/N C=(Σ3-1c5)/S D=(Σ3-2c5)/S	Indifferent (A+B)/2 A=(Σ4-1a4,5)/S B=(Σ4-2b4,5)/S
1	Adaptive (A+B)/2 A=(Σ1-2a)/N B=(Σ1-2b)/N	Discuss (A+B)/2 A=(Σ2-2a)/N B=(Σ2-2b)/N	Store (A+B)/2 A=(Σ3-1a1,2,3,4)/S B=(Σ3-2a1,2,3,4)/S	Store (A+B)/2 A=(Σ3-1b1,2,3,4)/S B=(Σ3-2b1,2,3,4)/S	One (A+B+C+D)/4 A=(Σ1-2c)/N B=(Σ2-2c)/N C=(Σ3-1c1,2,3,4)/S D=(Σ3-2c1,2,3,4)/S	In-box (Σ4-1a1,2,3)/S
2	Transforma-tive (A+B)/2 A=(Σ1-3a)/N B=(Σ1-3b)/N	Dialogue (A+B)/2 A=(Σ2-3a)/N B=(Σ2-3b)/N	Disseminate (Σ3-3a1,2,3)/S	Disseminate (Σ3-3b1,2,3)/S	Two (A+B+C)/3 A=(Σ1-3c)/N B=(Σ2-3c)/N C=(Σ3-3c1,2,3)/S	Out-box (Σ4-2b1,2,3)/S

VISION
where the organization wants to be in the future

Level	**Individual** has it	**Team** enables it	**Department** is directed	**Organi-zation** is directed	**Environment** influences	
					Direct	**General**
0	Not know (Σ1-2a2)/N	Not discussed (A+B+C+D)/4 A=(Σ2-1a3,4,5)/S B=(Σ2-2a3,4,5)/S C=(Σ2-1b3,4,5)/S D=(Σ2-2b3,4,5)/S	No vision (Σ1-1a2)/N	No vision (Σ1-1a2)/N	Null (A+B+C+D)/4 A=(Σ1-2b4)/N B=(Σ2-1c3,4,5)/S C=(Σ2-2c3,4,5)/S D=1-(Σ1-1b1,2,3,4)/S	Restrictive (Σ4-2b4,5)/S
1	Knows vision (Σ1-2a1)/N	Distribute (A+B)/2 A=(Σ2-2a1,2,3)/S B=(Σ2-2b1,2,3)/S	Top-down (Σ3-1a+Σ3-2a)/S	Top-down (Σ3-1b+Σ3-2b)/S	One (A+B+C)/3 A=(Σ1-2b1,2,3)/S B=(Σ2-2c1,2,3)/S C(Σ3-1c+Σ3-2c)/S	Indifferent (Σ4-2b3)/N
2	Personal vision (A+B)/2 A=(Σ1-3a1)/N B=(Σ1-4a1)/N	Create (A+B)/2 A=(Σ2-1a1,2,3)/S B=(Σ2-1b1,2,3)/S	Shared (Σ3-3a)/N	Shared (Σ3-3b1)/N	Two (A+B+C+D)/4 A=(Σ1-3b1,2,3)/S B=(Σ1-4b1,2,3)/S C=(Σ2-1c1,2,3)/S D=(Σ3-3c)/N	Supportive (Σ4-2b1,2)/S

STRATEGY

Strategy is creation of a unique and valuable position, through creating fit among and integrating company's activities and by making trade-offs in competing

	Individual works it	**Team** enables it	**Department** has it	**Organization** has it	**Environment** influences	
					Direct	**General**
Level **0**	Not know (Σ1-2a2)/N	Not discussed (A+B+C+D)/4 A=(Σ2-1a3,4,5)/S B=(Σ2-2a3,4,5)/S C=(Σ2-1b3,4,5)/S D=(Σ2-2b3,4,5)/S	Not clear (Σ1-1a2)/N	Not clear (Σ1-1a2)/N	Null (A+B+C+D)/4 A=(Σ1-2b4)/N B=(Σ2-1c3,4,5)/S C=(Σ2-2c3,4,5)/S D=1-(Σ1-1b1,2,3,4)/S	Restrictive (Σ4-2b4,5)/S
1	Knows (Σ1-2a1)/N	Distribute (A+B)/2 A=(Σ2-2a1,2,3)/S B=(Σ2-2b1,2,3)/S	Top-down (Σ3-1a+Σ3-2a)/S	Top-down (Σ3-1b+Σ3-2b)/S	One (A+B+C)/3 A=(Σ1-2b1,2,3)/S B=(Σ2-2c1,2,3)/S C(Σ3-1c+Σ3-2c)/S	Indifferent (Σ4-2b3)/N
2	Propose (A+B)/2 A=(Σ1-3a1)/N B=(Σ1-4a1)/N	Create (A+B)/2 A=(Σ2-1a1,2,3)/S B=(Σ2-1b1,2,3)/S	Shared (Σ3-3a)/N	Shared (Σ3-3b1)/N	Two (A+B+C+D)/4 A=(Σ1-3b1,2,3)/S B=(Σ1-4b1,2,3)/S C=(Σ2-1c1,2,3)/S D=(Σ3-3c)/N	Supportive (Σ4-2b1,2)/S

CULTURE

a pattern of assumptions, values and norms that are more or less shared by an organization's member

Level	**Individual** has it	**Team** enables it	**Department** implies it	**Organization** implies it	**Environment** influences	
					Direct	**General**
0	Stop (A+B+C+D+E)/5 A=(Σ1-1a4,5)/S B=(Σ1-2a4,5)/S C=(Σ1-3a4,5)/S D=(Σ1-4a4,5)/S E=(Σ1-5a4,5)/S	Stop (A+B+C+D+E)/5 A=(Σ1-1b4,5)/S B=(Σ1-2b4,5)/S C=(Σ1-3b4,5)/S D=(Σ1-4b4,5)/S E=(Σ1-5b4,5)/S	Stop (A+B+C+D+E)/5 A=(Σ1-1c4,5)/S B=(Σ1-2c4,5)/S C=(Σ1-3c4,5)/S D=(Σ1-4c4,5)/S E=(Σ1-5c4,5)/S	Stop (A+B+C+D+E)/5 A=(Σ1-1d4,5)/S B=(Σ1-2d4,5)/S C=(Σ1-3d4,5)/S D=(Σ1-4d4,5)/S E=(Σ1-5d4,5)/S	Null (A+B+C+D+E)/5 A=(Σ1-1e4,5)/S B=(Σ1-2e4,5)/S C=(Σ1-3e4,5)/S D=(Σ1-4e4,5)/S E=(Σ1-5e4,5)/S	Stop (A+B+C+D+E)/5 A=(Σ1-1f4,5)/S B=(Σ1-2f4,5)/S C=(Σ1-3f4,5)/S D=(Σ1-4f4,5)/S E=(Σ1-5f4,5)/S
1	Bounded (A+B+C+D+E)/5 A=(Σ1-1a3)/N B=(Σ1-2a3)/N C=(Σ1-3a3)/N D=(Σ1-4a3)/N E=(Σ1-5a3)/N	Bounded (A+B+C+D+E)/5 A=(Σ1-1b3)/N B=(Σ1-2b3)/N C=(Σ1-3b3)/N D=(Σ1-4b3)/N E=(Σ1-5b3)/N	Boundary (A+B+C+D+E)/5 A=(Σ1-1c3)/N B=(Σ1-2c3)/N C=(Σ1-3c3)/N D=(Σ1-4c3)/N E=(Σ1-5c3)/N	Boundary (A+B+C+D+E)/5 A=(Σ1-1d3)/N B=(Σ1-2d3)/N C=(Σ1-3d3)/N D=(Σ1-4d3)/N E=(Σ1-5d3)/N	One (A+B+C+D+E)/5 A=(Σ1-1e3)/N B=(Σ1-2e3)/N C=(Σ1-3e3)/N D=(Σ1-4e3)/N E=(Σ1-5e3)/N	Boundary (A+B+C+D+E)/5 A=(Σ1-1f3)/N B=(Σ1-2f3)/N C=(Σ1-3f3)/N D=(Σ1-4f3)/N E=(Σ1-5f3)/N
2	Open (A+B+C+D+E)/5 A=(Σ1-1a1,2)/S B=(Σ1-2a1,2)/S C=(Σ1-3a1,2)/S D=(Σ1-4a1,2)/S E=(Σ1-5a1,2)/S	Open (A+B+C+D+E)/5 A=(Σ1-1b1,2)/S B=(Σ1-2b1,2)/S C=(Σ1-3b1,2)/S D=(Σ1-4b1,2)/S E=(Σ1-5b1,2)/S	Open (A+B+C+D+E)/5 A=(Σ1-1c1,2)/S B=(Σ1-2c1,2)/S C=(Σ1-3c1,2)/S D=(Σ1-4c1,2)/S E=(Σ1-5c1,2)/S	Open (A+B+C+D+E)/5 A=(Σ1-1d1,2)/S B=(Σ1-2d1,2)/S C=(Σ1-3d1,2)/S D=(Σ1-4d1,2)/S E=(Σ1-5d1,2)/S	Two (A+B+C+D+E)/5 A=(Σ1-1e1,2)/S B=(Σ1-2e1,2)/S C=(Σ1-3e1,2)/S D=(Σ1-4e1,2)/S E=(Σ1-5e1,2)/S	Open (A+B+C+D+E)/5 A=(Σ1-1f1,2)/S B=(Σ1-2f1,2)/S C=(Σ1-3f1,2)/S D=(Σ1-4f1,2)/S E=(Σ1-5f1,2)/S

POWER

Influence of one person over others, stemming from an individual characteristic, an interpersonal relationship, a position in an organization, or from membership in a societal group

Level	**Individual** has it	**Team** has it	**Department** makes it	**Organization** makes it	**Environment** influences	
					Direct	**General**
0	No (A+B+C+D)/4 A=(Σ1-1a5)/N B=(Σ1-2a5)/N C=(Σ1-1b5)/N D=(Σ1-2b5)/N	None (A+B+C+D)/4 A=(Σ2-1a5)/N B=(Σ2-2a5)/N C=(Σ2-1b5)/N D=(Σ2-2b5)/N	Concentrated (A+B)/2 A=(Σ3-1a)/N B=(Σ4-3a)/N	Concentrated (A+B)/2 A=(Σ3-1b)/N B=(Σ4-3b)/N	Null (A+B+C+D+E+F)/6 A=(Σ1-1c5)/N B=(Σ1-2c5)/N C=(Σ2-1c5)/N D=(Σ2-2c5)/N E=(Σ3-1c)/N F=(Σ4-3c)/N	Concentrated top down (A+B)/2 A=(Σ5-2b1,2)/S B=(Σ5-1a1,2)S
1	Operational (A+B)/2 A=(Σ1-1a1,2,3,4)/S B=(Σ1-1b1,2,3,4)/S	Operational (A+B)/2 A=(Σ2-1a1,2,3,4)/S B=(Σ2-1b1,2,3,4)/S	Top down (A+B)/2 (Σ3-2a)/N (Σ4-1a)/N	Top down (A+B)/2 (Σ3-2b)/N (Σ4-1b)/N	One (A+B+C+D)/4 A=(Σ1-1c1,2,3,4)/S B=(Σ2-1c1,2,3,4)/S C=(Σ3-2c)/N D=(Σ4-1c)/N	Mixed (A+B)/2 A=(Σ5-1a3)/N B=(Σ5-2b3)/N
2	Business (A+B)/2 A=(Σ1-2a1,2,3,4)/S B=(Σ1-2b1,2,3,4)/S	Business (A+B)/2 A=(Σ2-2a1,2,3,4)/S B=(Σ2-2b1,2,3,4)/S	Bottom up (A+B)/2 A=(Σ3-3a)/N B=(Σ4-2a)/N	Bottom up (A+B)/2 A=(Σ3-3b)/N B=(Σ4-2b)/N	Two (A+B+C+D)/4 A=(Σ1-2c1,2,3,4)/S B=(Σ2-2c1,2,3,4)/S C=(Σ3-3c)N D=(Σ4-2c)/N	Distributed bottom up (A+B)/2 A=(Σ5-1a4,5)/S B=(Σ5-2b4,5)/S

STRUCTURE

represents the formal way of identifying who is to take responsibility for what; who is to exercise authority over whom; and who is to be answerable to whom

Level	**Individual** fits in	**Team** follows it	**Department** has it	**Organization** has it	**Environment** influences	
					Direct	**General**
0	Not clear (A+B)/2 A=(Σ1-1a3,4,5)/S B=(Σ1-1b3,4,5)/S	No teams (A+B+A1+B1)/4 A1=(Σ2-1a3,4,5)/S B1=(Σ2-2a3,4,5)/S A2=(Σ2-1b3,4,5)/S B2=(Σ2-2b3,4,5)/S	No flexibility (A+B)/2 A=(Σ3-1a)/N B=(Σ4-1a5)/N	No flexibility (A+B)/2 A=(Σ3-1b)/N B=(Σ4-1b5)/N	Null (A+B+C+D+E)/5 A=(Σ1-1c3,4,5)/S B=(Σ2-1c3,4,5)/S C=(Σ2-2c3,4,5)/S D=(Σ3-1c5)/N E=(Σ4-1c5)/N	Fixed bureaucracy (A+B)/2 A=(Σ5-1a1,2)/S B=(Σ5-2b4,5)/S
1	Clear fix (A1+B1+A2+B2)/4 A1=(Σ1-1a1,2,3)/S B1=(Σ1-2a3,4,5)/S A2=(Σ1-1b1,2,3)/S B2=(Σ1-2b3,4,5)/S	Functional (A+B)/2 (Σ2-1a1,2,3)/S (Σ2-1b1,2,3)/S	Bounded flexibility (A+B)/2 A=(Σ3-2a)/N B=(Σ4-1a3,4)/S	Bounded flexibility (A+B)/2 A=(Σ3-2b)/N B=(Σ4-1b3,4)/S	One (A+B+C+D+E)/5 A=(Σ1-1c1,2,3)/S B=(Σ1-2c3,4,5)/S C=(Σ2-2c1,2,3)/S D=(Σ3-2c)/N E=(Σ4-1c3,4)/S	Flexible (A+B)/2 A=(Σ5-1a3)/N B=(Σ5-2b3)/N
2	Adaptive (A+B)/2 A=(Σ1-2a1,2,3)/S B=(Σ1-2b1,2,3)/S	Organizational (A+B)/2 A=(Σ2-2a1,2,3)/S B=(Σ2-2b1,2,3)/S	Embedded flexibil-ity (A+B)/2 A=(Σ3-3a)/N B=(Σ4-1a1,2)/S	Embedded flexibility (A+B)/2 A=(Σ3-3b)/N B=(Σ4-1b1,2)/S	Two (A+B+C+D)/4 A=(Σ1-2c1,2,3)/S B=Σ2-2c1,2,3)/S C=(Σ3-3c)/N D=(Σ4-1c1,2)/S	Organic (A+B)/2 A=(Σ5-1a4,5)/S B=(Σ5-2b1,2)/S

PROCESSES

A structured set of activities designed to produce a specific output

Level	**Individual** uses it	**Team** makes it	**Department** has it	**Organization** has it	**Environment** influences	
					Direct	**General**
0	Not clear (A+B)/2 A=(Σ1-1a3,4,5)/S B=(Σ1-1b3,4,5)/S	No support (A+B)/2 A=(Σ2-1a3,4,5)/S B=(Σ2-1b3,4,5)/S	Not clear (A+B)/2 A=(Σ3-1a3,4,5)/S B=(Σ3-2a3,4,5)/S	Not clear (A+B)/2 A=(Σ3-1b3,4,5)/S B=(Σ3-2b3,4,5)/S	Null (A+B+C+D)/4 A=(Σ1-1c3,4,5)/S B=(Σ2-1c3,4,5)/S C=(Σ3-1c3,4,5)/S D=(Σ3-2c3,4,5)/S	Not clear (Σ3-1d3,4,5)/S
1	Clear own (A+B)/2 A=(Σ1-1a1,2,3)/S B=(Σ1-1b1,2,3)/S	Support (A+B)/2 A=(Σ2-1a1,2,3)/S B=(Σ2-1b1,2,3)/S	Clear (A+B)/2 A=(Σ3-1a1,2,3)/S B=(Σ3-2a1,2,3)/S	Clear (A+B)/2 A=(Σ3-1b1,2,3)/S B=(Σ3-2b1,2,3)/S	One (A+B+C+D)/4 A=(Σ1-1c1,2,3)/S B=(Σ2-1c1,2,3)/S C=(Σ3-1c1,2,3)/S D=(Σ3-2c1,2,3)/S	Clear (A+B)/2 A=(Σ3-1d1,2,3)/S B=(Σ3-2d1,2,3)/S
2	Clear fit (A+B)/2 A=(Σ1-2a1,2,3)/S B=(Σ1-2b1,2,3)/S	Relate (A+B)/2 A=(Σ2-2a1,2,3)/S B=(Σ2-2b1,2,3)/S	Modular Σ3-3a1,2,3/S	Modular Σ3-3b1,2,3/S	Two Σ3-3c1,2,3/S	Modular Σ3-3d1,2,3/S

TECHNOLOGY

all the artifacts the organization uses to support the information activities in the organization

Level	**Individual** uses it for	**Team** uses it for	**Department** has	**Organization** has	**Environment** influences	
					Direct	**General**
0	Nothing (A+B+C+D+E+F)/6 A=(Σ4-1a2)/N B=(Σ4-4a2)/N C=(Σ4-5a2)/N D=(Σ4-1b2)/N E=(Σ4-4b2)/N F=(Σ4-5b2)/N	Nothing (A+B)/2 A= (Σ2-1a2)/N B= (Σ2-1b2)/N	Nothing (A+B+C)/3 A=(Σ1-1a2)/N B=(Σ1-2a2)/N C=(Σ1-5a2)/N	Nothing (A+B+C)/3 A=(Σ1-1b2)/N B=(Σ1-2b2)/N C=(Σ1-5b2)/N	Null (A+B+C+D+E+F+G)/7 A=(Σ4-1c2)/N B=(Σ4-4c2)/N C=(Σ4-5c2)/N D= (Σ2-1c2)/N E=(Σ4-1c2)/N F=(Σ4-4c2)/N G=(Σ4-5c2)/N	Restrictive Σ(5-1a4,5)/S
1	Communication (A+B+C+D+E+F)/6 A=(Σ4-1a1)/N B=(Σ4-4a1)/N C=(Σ4-5a1)/N D=(Σ4-1b1)/N E=(Σ4-4b1)/N F=(Σ4-5b1)/N	Communication (A+B)/2 A= (Σ3-1a1)/N B= (Σ3-1b1)/N	Communication (A+B+C)/3 A=(Σ1-1a1)/N B=(Σ1-2a1)/N C=(Σ1-5a1)/N	Communication (A+B+C)/3 A=(Σ1-1b1)/N B=(Σ1-2b1)/N C=(Σ1-5b1)/N	One (A+B+C+D+E+F+G)/7 A=(Σ4-1c1)/N B=(Σ4-4c1)/N C=(Σ4-5c1)/N D= (Σ3-1c1)/N E=(Σ1-1c1)/N F=(Σ1-2c1)/N G=(Σ1-5c1)/N	Neutral Σ(5-1a3)/N
2	Creation (A+B+C+D)/4 A=(Σ4-2a1)/N B=(Σ4-3a1)/N C=(Σ4-2b1)/N D=(Σ4-3b1)/N	Creation (A+B)/2 A= (Σ3-2a1)/N B= (Σ3-2b1)/N	Creation (A+B)/2 A=(Σ1-3a1)/N B=(Σ1-4a1)/N	Creation (A+B)/2 A=(Σ1-3b1)/N B=(Σ1-4b1)/N	Two (A+B+C+D+E)/5 A=(Σ4-2c1)/N B=(Σ4-3c1)/N C= (Σ3-2c1)/N D=(Σ1-3c1)/N E=(Σ1-4c1)/N	Supportive Σ(5-1a1,2)/S

LEADERSHIP
the process of providing direction and influencing individuals or groups to achieve goals

		Individual is	**Team** shows it	**Department** has it	**Organization** has it	**Environment** influences	
						Direct	**General**
Level	**0**	Not leader Σ1-1a2/N	No leader (Σ3-1a3,4,5)/S	No clear leadership (Σ3-1b3,4,5)/S	No clear leadership (Σ3-1c3,4,5)/S	Null (Σ3-1d3,4,5)/S	No clear leadership (Σ3-1e3,4,5)/S
	1	Transactional Σ2-1a/S	Manager as leader (Σ6-1a3,4,5)/S	Leaders from top (A+B+C)/3 A=(Σ4-1a1,2,3,4)/S B=(Σ5-1a1,2,3)/S C=(Σ6-1b3,4,5)/S	Leaders from top (A+B+C)/3 A=(Σ4-2a1,2,3,4)/S B=(Σ5-1b1,2,3)/S C=(Σ6-1c3,4,5)/S	One (A+B+C)/3 A=(Σ4-3a1,2,3,4)/S B=(Σ5-1c1,2,3)/S C=(Σ6-1d3,4,5)/S	Leaders from top (A+B)/2 A=(Σ4-4a1,2,3,4)/S B=(Σ5-1d1,2,3)/S
	2	Transformational Σ2-1a/S	Team leader (Σ6-1a1,2,3)/S	Ecology of leader-ship (A+B+C)/3 A=(Σ4-1a2,3,4,5)/S B=(Σ5-1a3,4,5)/S C=(Σ6-1b1,2,3)/S	Ecology of leader-ship (A+B+C)/3 A=(Σ4-2a2,3,4,5)/S B=(Σ5-1b3,4,5)/S C=(Σ6-1c1,2,3)/S	Two (A+B+C)/3 A=(Σ4-3a2,3,4,5)/S B=(Σ5-1c3,4,5)/S C=(Σ6-1d1,2,3)/S	Ecology of leadership (A+B)/2 A=(Σ4-4a2,3,4,5)/S B=(Σ5-1d3,4,5)/S

CHANGE

an act or process within the organization through which something becomes different

Level	**Individual** practices	**Team** spreads	**Department** has done it	**Organization** has done it	**Environment** influences	
					Direct	**General**
0	Static (A+B)/2 A=(Σ1-1a)/S B=(Σ1-1b)/S	Standing together (A+B)/2 A=(Σ3-1a5)/N B=(Σ3-1b5)/N	No change (A+B)/2 A=(Σ2-1a3,4,5)/S B=(Σ2-2a3,4,5)/S	No clear leadership (A+B)/2 A=(Σ2-1b3,4,5)/S B=(Σ2-2b3,4,5)/S	Null (A+B+C)/3 A=(Σ1-1c)/S B=(Σ2-1c3,4,5)/S C=(Σ2-2c3,4,5)/S	No change (A+B)/2 A=(Σ2-1d3,4,5)/S B=(Σ2-2d3,4,5)/S
1	Steps (A+B)/2 A=(Σ1-2a)/S B=(Σ1-2b)/S	Walking together (A+B)/2 A=(Σ3-1a1,2,3,4)/S B=(Σ3-2a1,2,3,4)/S	Efficiency change (Σ2-1a1,2,3)/S	Leaders from top (Σ2-1b1,2,3)/S	One (A+B)/2 A=(Σ1-2c)/S B=(Σ2-1c1,2,3)/S	Incremental A=(Σ2-1d1,2,3)/S
2	Run (A+B)/2 A=(Σ1-3a)/S B=(Σ1-3b)/S	Running together (A+B)/2 A=(Σ3-1b1,2,3,4)/S B=(Σ3-2b1,2,3,4)/S	Business change (Σ2-2a1,2,3)/S	Ecology of leadership (Σ2-2b1,2,3)/S	Two (A+B)/2 A=(Σ1-3c)/S B=(Σ2-2c1,2,3)/S	Transformational A=(Σ2-2c1,2,3)/S